PREFACE

The Plan Preparation Guide is intended for the use of Road Design and other SCDOT Personnel as a technical guide for the design of highways and preparation of plans. It is to be used as a supplement to the SCDOT Highway Design Manual, various AASHTO Manuals, and the accepted standard practices of the South Carolina Department of Transportation.

This Guide was prepared by the Department's Road Design Personnel from previous design material and accepted engineering practices with the approval of the Road Design Engineer. This Guide is written to provide assistance to the designer by supplementing existing design policies, manuals, and directives recognized by the Department. The Plan Preparation Guide is an effort in providing uniformity, clarity, and accuracy to the plans developed by and for the Department. Revisions and updates to the Guide can be viewed in the Plan Preparation Guide hotlink in the Design Documents Section on Road Design's Home Page. A full, updated version of the Plan Preparation Guide will also be available in this section. It is the responsibility of the user to acquire the new version of the guide.

Road Design
Plan Preparation Guide

Table of Contents

Table of Contents (continued)

Table of Contents (continued)

Table of Contents (continued)

Table of Contents (continued)

Plan Preparation Guide

Chapter 1

Plan Covers – Title Sheets
Quantity Sheets - Standard Drawings

1. Plan Cover

Covers are fairly simple and easy to do, but are very informative. The blank covers are made in the Engineering Reproduction System and can be obtained there. The cover should contain the same information as the heading on the Title Sheet, which is the County, File No., Project No., Route No. or Road No., and the Termini. Horizontal description should be spaced with the bottom line 2" from the bottom of the cover and 2" Right of the Tape with 0.4" spacing between the lines. Lettering should be 0.5" high and the pin number should be shown in pencil above the county. Vertical description should contain the County, File No., and Route No. or Road No. and should be placed along the edge of the cover 2" from the bottom of cover. Design Group Coordinators' initials should be placed below this description. (See figure 1-A). The lettering should be neat and legible and height of lettering and spacing may be varied slightly for each individual's preference. The cover contains other valuable information such as when the project was sent to Right-Of-Way and when any revisions were sent. The date and the initials of the person sending the project to Right-Of-Way will be shown in the lower left corner in green.

Revisions will be shown in red along the tape of the cover showing sheets revised, date revisions were sent to Right-Of-Way, and initials of the person sending revisions.

When the "write up" for the Long Ad is completed, "Long Ad Completed" and the letting date will be stamped in the lower right corner. If this stamp has been placed on the cover, NO changes should be made before contacting the person doing the "write up" for the Long Ad.

When plans have been let and awarded, they will be filed in the Plans Storage room. At this time, a drawer number will be assigned to each set of plans and will be stamped above the item number.

See figure 1-A for an example of a cover.

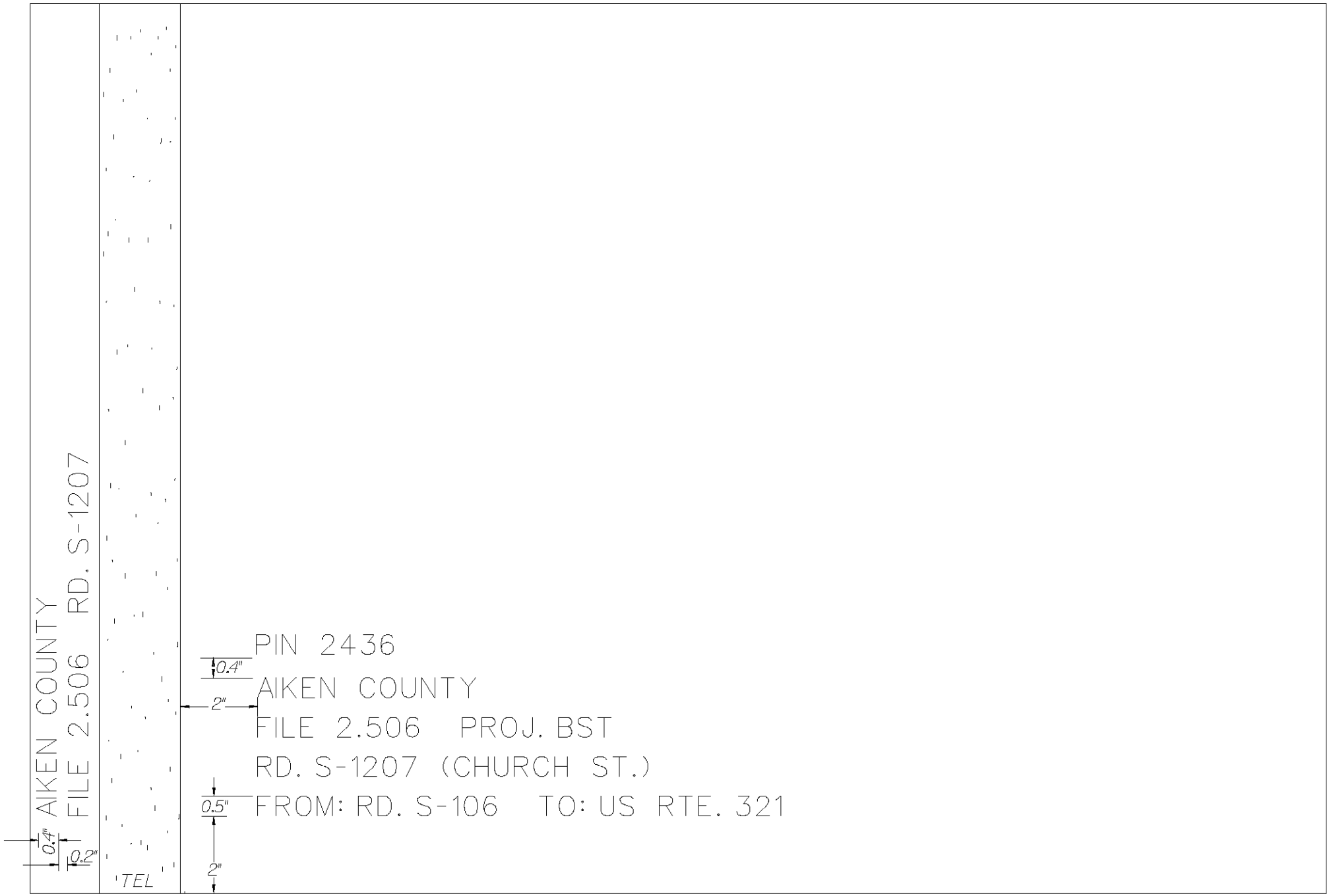

AIKEN COUNTY
FILE 2.506 RD. S-1207
0.4"
0.2"
TEL
PIN 2436
0.4"
AIKEN COUNTY
2"
FILE 2.506 PROJ. BST
RD. S-1207 (CHURCH ST.)
0.5"
FROM: RD. S-106 TO: US RTE. 321
2"

FIGURE 1-A

2. Title Sheets

In-house Plan Title Sheets have been updated and are shown below:

Type	File Name
Primary Project – English	Std_form6.dgn
Primary Project – Metric	Metts2.dgn
Secondary Project – English	Esec_ts6.dgn
Secondary Project – Metric	Msec_ts6.dgn

Consultant Title Sheets have also been updated on the Internet for their use. Consultants are advised that the signature block on the bottom left corner is in a space shared by the "Certification Statement". Only one of these elements is needed. The Consultant will select the "Certification Statement" on Level 3 to be retained and the signature block on Level 4 to be deleted when the plans are contracted to be certified. If the plans are not required to be certified by the Consultant, then the "Certification Statement" will be deleted leaving the signature block. There is no need for both on the Title Sheet. The names of the CADD Consultant Title Sheets are ECLTTS.DGN for English and MCLTTS.DGN for metric.

The Heading should come directly under the standard logo and be centered under it. It should include the County, File, Project, Road or Route Number, Road Name (if available) and Termini.

On "C" projects, show only the county number (36., etc) on the File Number and C- on the Project Number. Be sure to leave enough space to add four numbers as these will be added when the project is placed in a letting. On other projects, complete File and Project Numbers may be shown.

Road names should be used with road numbers when available. Be sure the termini describe the project accurately and completely. Termini should match termini shown in PPMS as closely as possible.

The location map should come directly under the heading and should contain enough information, such as city, town, or other landmarks so the project is easily located. The proposed project should be shown as accurate as possible with a wide, heavy line. An arrow showing direction of the survey should be shown along the proposed project. The map should be positioned so that North is straight up on the page if possible. A North arrow must be shown. A note with File Number, Project Number, Road or Route Number, Beginning and Ending station, and sheet numbers of plan and profile should be shown with arrows pointing to the beginning and ending of the project on the location map.

Also show a note, where applicable, for exception to project with Sta.____to Sta.____, length of exception, and what the exception is (Road, Railroad, Bridge in Place, etc.) with an arrow pointing to the exception on the location map. Notes may be located to best utilize available space on the title sheet.

A note must be shown for new bridges to be constructed consisting of length, type (precast, prestressed, R. C., etc.), Sta.____to Sta.____, and File number of bridge if it is being let under a separate file number. The scale of the map will be shown below the words "Layout" directly under the map. The map name should be shown under the map (i.e. RICHLAND CO., CITY OF COLUMBIA, etc). Below this is the mileage box that must be filled out completely and accurately. On "C" projects with more than one road in the same item, each road should be shown separately and a column with the total mileage. When binding more than one road with separate item and/or pin numbers together, you must have separate mileage for each one. On

primary projects, show main line mileage, side road mileage, ramps, etc. and show a separate column with total mileage. Gross length of project should be Total Length including exceptions and bridges. Less out length of exceptions to get the Net Length of project and less out bridges to get the Net Length of roadway.

Equalities in stationing should be listed under mileage box. Examples: Sta. 10+15.5 Back = Sta. 13+25.5 Ahead (-310') or Sta. 10+15.5 Back = Sta. 7+7.5 Ahead (+240'). If there are no equalities the word "None" should be shown.

If the project is inside town or city limits, the box for mayor's and council members' signatures should be completed. Example: Approved for City of Columbia or Town of Prosperity, making sure to use City of or Town of, whichever is applicable.

The Design Group Coordinator and person completing plans initials should appear at the bottom and center of the page.

All projects must have present Traffic Data shown in the blanks provided. For projects requiring a pavement design, future Traffic Data for the Design Year and the percent of trucks as shown on the pavement design shall also be shown.

The Index of Sheets should be shown in the upper left corner and will be discussed in Chapter 15.

The Project Identification Box in the upper right corner should be filled out and the PIN number shall be shown directly above this box.

The NPDES block must be filled in and also the longitude and latitude block.

The Railroad Involvement Box must be completed by circling YES if a railroad is involved and NO if none are involved.

See figure 1-B for an example of a title sheet and figure 20-B on page 3-20 (4) of the Highway Design Manual.

File No. and Project No. are to be filled out on Primary and Interstate Projects. On "C" Projects this space is left blank until the project is ready to be let.

The design reference used for roadway design will be referenced on each set of plans in a note added to the Title Sheet. The note will be added along the right border of the Title Sheet above the NPDES permit information. Two cells have been created and added to the cell library to indicate which AASHTO "A Policy on Geometric Design of Highways and Streets" was used as the design reference for the plans. The names of the cells are GB-9094 and GB 2001 for the AASHTO references dated 1990/1994 and 2001, respectively. Select and place only one cell.

All projects including SWIM, HIMP, and other minimal design plans, except for most resurfacing/rehabilitation projects, should have full-size road plans developed for bidding and archiving. These projects regardless of how small they are will be archived and entered into PALS and will be available for future reference. This procedure will be followed for all projects whether right of way is acquired or not. If you have any questions concerning the need for full-size plans on a specific project, please see your Project Facilitator.

PIN NO. 14345

RDSQ038
TOWER\14345\R14345FF.DGN

FED. ROAD DIV. NO.	STATE	COUNTY	FILE NO.	PROJECT NO.	ROAD/ROUTE NO.	SHEET NO.	TOTAL SHEETS
3	S.C.	AIKEN			S.C. 118	1	19

INDEX OF SHEETS

SHEET NO.	DESCRIPTION	SHEET SUBTOTALS
1	TITLE SHEET	1
2	SUMMARY OF ESTIMATED QUANTITIES	
2A	MOVING AND DEMOLITION ITEMS	2
3	TYPICAL SECTION	1
4	OMIT	
5	GENERAL CONSTRUCTION NOTE	
5A	SURVEY CODES LEGEND	2
6 - 9	PLAN AND PROFILE SHEETS	4
X1 - X9	CROSS SECTIONS	9
	TOTALS	19

South Carolina Department of Transportation

COLUMBIA

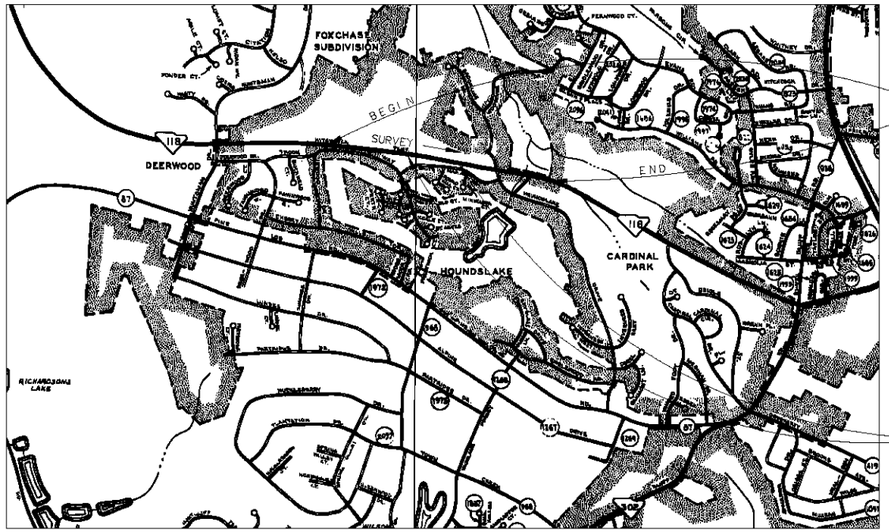
PLAN AND PROFILE OF PROPOSED STATE HIGHWAY

AIKEN COUNTY

FILE 2. PROJ. BST-

S. C. ROUTE 118 (HITCHCOCK PARKWAY)

FROM: 0.15 MILE WEST OF TRAILRIDGE ROAD TO: 0.19 MILE EAST OF HOUNDSLAKE DRIVE



AIKEN COUNTY MAP

Design Reference for these plans is the:

2001

AASHTO "A Policy on Geometric Design of Highways and Streets"

FILE 2. PROJ. BST- S. C. ROUTE 118
STA. 190+00.00 TO STA. 235+30.00 SEE SHEET NOS. 6 - 9

EXCEPTION TO PROJECT
STA. 205+34.00 TO STA. 217+52.00 (1218')

NPDES PERMIT INFORMATION

NPDES Disturbed Area - 5.824 Acres

Approximate Location of Roadway is :
Longitude 80°-45'-00"
Latitude 33°-32'-40"

RAILROAD INVOLVEMENT?
YES / (NO)

Hydrology and NPDES Design provided by:

SCDOT

Designs are on file with the SCDOT Hydraulic Section

PROGRAM DEVELOPMENT ENGINEER

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER NO. 7010 ROCQUE L. KNIEPE

FOR RIGHT OF WAY : _____ DATE _____
FOR CONSTRUCTION : _____ DATE _____

ROAD DESIGN ENGINEER

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER NO. 8858 EDWIN SYLVESTER EARGLE, II

FOR RIGHT OF WAY : _____ DATE _____
FOR CONSTRUCTION : _____ DATE _____

TRAFFIC DATA

1993 ADT 13,900

2013 ADT 19,500

TRUCKS 5 %

LAYOUT

SCALE 1 INCH - 1320 FEET

NET LENGTH OF ROADWAY	0.627	MILES
NET LENGTH OF BRIDGES		MILES
NET LENGTH OF PROJECT	0.627	MILES
LENGTH OF EXCEPTIONS	0.231	MILES
GROSS LENGTH OF PROJECT	0.858	MILES

EQUALITIES IN STATIONING

NONE

	RIGHT-OF-WAY INITIAL	RIGHT-OF-WAY DATE	CONSTRUCTION INITIAL	CONSTRUCTION DATE
GROUP COORDINATOR-ROAD DESIGN				
PROJECT FACILITATOR				
DESIGN SERVICES GROUP				
HYDRAULIC ENGINEER				
PROGRAM MANAGER				

LEGEND

PROPOSED PROJECT		
OTHER ROADS	PAV	ER

3 DAYS BEFORE DIGGING IN SOUTH CAROLINA

CALL 1-888-721-7877

PALMETTO UTILITY PROTECTION SERVICE

NOTE: ALL WORKMANSHIP AND MATERIAL ON THIS PROJECT TO CONFORM WITH SOUTH CAROLINA DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION (LATEST EDITION), AND BOOK OF STANDARD DRAWINGS FOR ROAD CONSTRUCTION.

APPROVED FOR DATE

MAYOR _____

COUNCIL MEMBERS

_____

_____

_____

_____

_____

_____

_____

CLERK _____

C. R. A. SQUAD 3 (S. H.)

STD FORMS.DGN

FIGURE 1-B

3. Summary of Estimated Quantity Sheet

This sheet is generated in the "CATS" program and should shown the Pay Item Number, description, quantity, and unit of measure for all quantities needed to construct the project. The first three digits refer to the particular section of the SCDOT "Standard Specifications for Highway construction". The last four numbers of the system are unique to a particular bid (Pay) item. Extreme care should be taken to insure that each bid item has the correct BAMS number assigned to it and correct quantity and unit shown. Pay Items and quantities on the Summary of Estimated Quantity Sheet and the "CATS" program must be identical. Don't forget to include Removal and Disposal Items and Moving Items in the "CATS" program.

"C" projects with more than one road with the same pin number, quantities may be shown separately but must have a total quantity column. This is not necessary but may be a personal preference. "C" projects with more than one PIN number bound together, each PIN must have a total quantity column. Also, projects that are located in more than one county must have separate quantities for each county.

On certain projects, the Bid items, Contract Time and On the Job Trainees are added after review by the Specification and Estimates engineer. These items must be entered into the "CATS" System but should not show on the Summary of Estimated Quantity Sheet.

"C" projects and other small projects, where it is possible, place quantities in the right column of the sheet.

See figures 1-C and 1-D and figures 20-C and 20-C/1 on sheets 3-20 (9) and 3-20 (10) in the Highway Design Manual.

When revising plans already let and awarded, and quantity changes are involved, these additional or deleted quantities should be shown on the first sheet of the revision. If there is not ample room on the first sheet of the revision, show on the next sheet that does have ample room. If there is not ample room on any plan sheet, then they should be shown on the "General Construction Note" sheet. When quantity additions or deletions are shown on a sheet other than the one being revised, the revision note under the Title box should designate which sheet the quantity revisions are shown on.

R0S0038
TOWERR0S003/13521/
R13521PF.DGN

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION

FED. AID DIV. NO.	STATE	COUNTY	FILE		ROAD NO.	SHEET NO.	
3	S.C.	PICKENS			S-1020	2	

SUMMARY OF ESTIMATED QUANTITIES

ITEM NO.	PAY ITEM	QUANTITY	PAY UNIT
1031000	MOBILIZATION	NEC.	LS
2011000	CLEARING AND GRUBBING WITHIN RIGHT-OF-WAY	NEC.	LS
2012000	CLEARING AND GRUBBING WITHIN ROAD WAY	0.654	ACRE
2031000	UNCLASSIFIED EXCAVATION	7464.000	CY
	GROUP A - SELECT FROM THE FOLLOWING ALTERNATE PAYITEMS		
	BIDDERS SHALL BID ON ONLY ONE ALTERNATE FROM GROUP A		
	ALTERNATE 1		
3051200	MACADAM BASE CR. (6" UNIF.)	16781.000	SY
	ALTERNATE 2		
3063190	MARINE LIMESTONE BASE CR.	16781.000	SY
	ALTERNATE 3		
3063310	RECYCLED PC CONC. COURSE (6" UNIFORM)	16781.000	SY
	GROUP A - END ALTERNATE SELECTION		
3063305	RECYCLED PC CONC. BASE CR.	50.000	TON
3069900	MAINTENANCE STONE	50.000	TON
4010005	PRIME COAT	20.000	GAL
4084000	BITUMINOUS SURFACING (TRIPLE TREATMENT) TYPE 4	16120.000	SY
6051005	PERMANENT CONSTRUCTION SIGNS	214.000	SF
	GROUP B - SELECT FROM THE FOLLOWING ALTERNATE PAYITEMS		
	BIDDERS SHALL BID ON ONLY ONE ALTERNATE FROM GROUP B		
	ALTERNATE 1		
7141112	15" RC PIPE CUL.-CLASS III	144.000	LF
7141113	18" RC PIPE CUL.-CLASS III	592.000	LF
	ALTERNATE 2		
7141794	15" CORRUGATED POLYETHYLENE (PE) PIPE CULVERT (TYPE S)	144.000	LF
7141796	18" CORRUGATED POLYETHYLENE (PE) PIPE CULVERT (TYPE S)	592.000	LF
	GROUP B - END ALTERNATE SELECTION		
7191275	CATCH BASIN -TYPE 9 SPECIAL MH	3.000	EA
7191605	CATCH BASIN -TYPE 16	4.000	EA
8041100	HAND PLACED RIPRAP	30.000	TON
8048200	GEOTEX/EROS. CONT. (CLASS 2) TYPE A	10.000	SY
8071000	RESET FENCE	90.000	LF
8101000	SEEDING (MULCHED)	26.889	MSY
8103000	TEMPORARY SEEDING	2.780	MSY
8104100	FERTILIZER(10-10-10)	2.780	TON
8105000	LIME	5.560	TON
8106000	NITROGEN	267.000	LBS
8109900	MOWING		
8152000	BALED STRAW	50.000	BALE
8153000	SILT FENCE	200.000	LF

STD_FORM2.DGN

FIGURE 1-C

RDSQ038
ZGA3:167,214)126TYP.DGN

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION

FED.ROAD DIV.NO.	STATE	COUNTY	FILE	PROJ.	ROUTE NO.	SHEET NO.	TOTAL SHEETS
4	S.C.	CHARLESTON	10.983	IM-0264(106)	I-26	2	

SUMMARY OF ESTIMATED QUANTITIES

ITEM NO.	PAY ITEM	QUANTITY	PAY UNIT
1031000	MOBILIZATION	NEC.	LS
1071000	TRAFFIC CONTROL	NEC.	LS
2023000	REMOVAL & DISPOSAL OF EXISTING PAVEMENT	13724.000	SY
2026000	REMOVAL & DISPOSAL OF EXISTING CONCRETE PAVEMENT(REHAB)	5653.000	SY
2031000	UNCLASSIFIED EXCAVATION	21604.000	CY
3062200	STAB. AGGR. BASE COURSE TYPE 2 (6' UNIFORM)	42999.000	SY
4011000	ASPH. CEMENT IN PAV. MIXTURE	9.000	TON
4011004	LIQUID BINDER	9.000	TON
4013150	MILLING EXISTING ASPHALT PAVEMENT 1.5'	1966.000	SY
4013990	MILLING EXISTING ASPHALT PAVEMENT (VARIABLE)	349.000	SY
4031200	HOT LAID ASPH. CONC. SURF. CR. TYPE 1A	68.000	TON
4037000	HOT LAID ASPH. CONC. SURF. CR. FOR DITCH PAVING	18.000	TON
4038000	HOT LAID ASPH. CONC. SURF. CR. FOR SHOULDERS	83.000	TON
5011200	PORTLAND CEMENT CONC. PAV. 9" UNIFORM	2569.000	SY
5016200	PORT. CEM. CONC. SHOULDERS 9" UNIF	43333.000	SY
5018105	PORTLAND CEMENT CONCRETE - SPECIAL USE	876.000	CY
6011005	PAINT 4" WHITE BROKEN LINES -(GAPS EXCLUDED)	42350.000	LF
6011010	PAINT 4" WHITE SOLID LINES (PVT. EDGE LINES)	3600.000	LF
6011015	PAINT 8" WHITE SOLID LINES (CROSSWALK & CHANNELIZATION)	5500.000	LF
6012010	PAINT 4" YELLOW SOLID LINES(PVT.EDGE & NO PASSING ZONE)	76200.000	LF
6021005	4" WHITE BROKEN LINES(GAPS EXCL.)THERMOPLASTIC- 90 MIL.	42355.000	LF
6021010	4" WHITE SOLID LINES (PVT. EDGE LINES) THERMO.- 90 MIL.	123000.000	LF
6021015	8" WHITE SOLID LINES THERMOPLASTIC - 125 MIL.	10990.000	LF
6021025	24" WHITE SOLID LINES (STOP/DIAG LINES)-THERMO.-125 MIL	1370.000	LF
6021030	WHITE SINGLE ARROWS (LT, STAGHT, RT) THERMO.-125 MIL.	38.000	EA
6021035	WHITE WORD MESSAGE 'ONLY' -THERMOPLASTIC - 125 MIL.	38.000	EA
6022010	4" YELLOW SOLID LINES(PVT.EDGE LINES) THERMO-90 MIL.	118700.000	LF
6031005	PERMANENT CLEAR PAVEMENT MARKERS- MONO-DIR.,REFL. 4"X4"	3200.000	EA
6031016	TEMPORARY CLEAR PAVEMENT MARKERS MONO-DIR.,REFL. 5"X2"	3900.000	EA
6033005	PERMANENT YELLOW PAVEMENT MARKERS BI-DIR.,REFL. 4"X4"	44.000	EA
6044004	REMOVABLE PAINT 4" WHITE BROKEN LINES	42350.000	LF
6044114	REMOVABLE PAINT 4" YELLOW SOLID LINES	76200.000	LF
6051005	PERMANENT CONSTRUCTION SIGNS	1161.000	SF
6051105	CONSTRUCTION ZONE ELECTRIC CHANGEABLE MESSAGE SIGN	4.000	EA
6052005	REMOVAL OF EXISTING MARKINGS	443155.000	LF
6060015	2.0" GALVANIZED RIGID CONDUIT	38400.000	LF
6060085	2.0" GALVANIZED RIGID CONDUIT (BORED AND JACKED)	1100.000	LF
6061005	LIGHT STANDARD FOUNDATION	128.000	EA
6061050	LIGHT STANDARD ANCHORAGE	49.000	EA
6082205	DELINEATORS, SINGLE, MONO, BRIDGE, WALL OR BARRIER MOUNTED	788.000	EA
6083105	MODIFICATION OF OVERHEAD SIGN STRUCTURE NO.(0001)	1.000	EA
6083105	MODIFICATION OF OVERHEAD SIGN STRUCTURE NO.(0003)	1.000	EA
6083105	MODIFICATION OF OVERHEAD SIGN STRUCTURE NO.(0004)	1.000	EA
6083105	MODIFICATION OF OVERHEAD SIGN STRUCTURE NO.(0005)	1.000	EA
6083105	MODIFICATION OF OVERHEAD SIGN STRUCTURE NO.(0006)	1.000	EA
6083105	MODIFICATION OF OVERHEAD SIGN STRUCTURE NO.(08-1)	1.000	EA
6083105	MODIFICATION OF OVERHEAD SIGN STRUCTURE NO.(08-2)	1.000	EA
6083105	MODIFICATION OF OVERHEAD SIGN STRUCTURE NO.(0010)	1.000	EA
7011400	CONC. FOR STRUCTURES - CLASS D	1199.800	CY
7012200	MACHINE PREPARATION OF EXISTING SURFACE	1787.000	SY
7031200	REINF. STEEL FOR STRUCTURES (BRIDGE)	151478.000	LBS
7141112	15" RC PIPE CUL.-CLASS III	32.000	LF
7141113	18" RC PIPE CUL.-CLASS III	4.000	LF
7141116	36" RC PIPE CUL.-CLASS III	8.000	LF
7191505	CATCH BASIN - TYPE 15 (SINGLE)	38.000	EA
7203210	CONCRETE CURB AND GUTTER(2'-0")	50.000	LF
7211000	BITUMINOUS CURB	39.000	LF
8021253	6" PERFORATED PIPE UNDERDRAIN WITH GEOTEXTILE	2000.000	LF
8034080	8" PIPE SLOPE DRAIN	200.000	LF
8041100	HAND PLACED RIPRAP	40.000	TON
8047040	SLOPE PROTECTION-4" CONCRETE	62.000	SY
8048200	GEOTEX/EROS.CONT. (CLASS 2) TYPE B	20.500	SY
8051100	STEEL BEAM GUARDRAIL	262.500	LF
8051110	REMOVAL OF EXIST. GUARDRAIL	38508.000	LF
8051900	RESET GUARDRAIL	150.000	LF
8052110	END ANCHORS-TYPE A	2.000	EA
8052600	THRIE BEAM G.R.BRIDGE CONN.	1.000	EA
8055610	TEMP. G.R. ENERGY ABSRBG.TERMINAL - 6 BAY- 2.0' WIDE	2.000	EA
8055880	HEX FOAM IMPACT ATTEN.9BAY(7'6" WIDE)WITH CONC.BACKUP	1.000	EA
8058215	CONCRETE MEDIAN BARRIER (TYPE 23)	26640.000	LF
8058216	CONCRETE MEDIAN BARRIER (TYPE 23)-LIGHT WEIGHT	10388.000	LF
8058220	CONCRETE MEDIAN BARRIER (TYPE 24)	520.000	LF
8058221	CONCRETE MEDIAN BARRIER(TYPE 24)AT BRIDGE SIGN SUPPORT-LT.WT	157.000	LF
8058225	CONCRETE MEDIAN BARRIER (TYPE 25)	909.000	LF
8059150	TEMPORARY CONCRETE BARRIER WITH NON-TEXTURED WHITE COATING	10500.000	LF

ITEM NO.	PAY ITEM	QUANTITY	PAY UNIT
8059200	TEMPORARY CONC.BARRIER(MOVEABLE)W/NON-TEXTURED WHITE COATING	10500.000	LF
8059210	TRANSFER AND TRANSPORT VEHICLE(TTV) MODEL 3	1.000	EA
8102100	SEEDING (UNMULCHED)	1.533	MSY
8103000	TEMPORARY SEEDING	0.383	MSY
8104100	FERTILIZER(10-10-10)	0.180	TON
8105000	LIME	0.320	TON
8106000	NITROGEN	15.000	LBS
8152000	BALED STRAW	175.000	BALE
8153000	SILT FENCE	1500.000	LF
8154000	SILT BASINS	200.000	CY
8109900	MOWING	100.000	MSY
8990001	CONCRETE BARRIER - SPECIAL	1455.000	LF
8990009	ASPHALTIC CONCRETE - SPECIAL USE	25.000	TON

STQ_FORM2.DGN

FIGURE 1-D

4. Removal and Disposal Items (Demolition Items), Moving Items Reset and New Fence Sheet

These sheets are standardized and CADD generated and are to be included in all projects requiring Moving Items and Removal and Disposal Items.

The columns designated "Item No." under Moving Items are used to designate a certain item. Each "Item No." may contain more than one particular moving item. One "Item No." should contain all moving items for each tract or property owner. This also holds true for the Removal and Disposal Items. If you are binding more than one "C" item together in a set of plans, begin each item with moving item No. 1. If you have more than one road in an item, continue numbering the items concurrently. This also applies to Removal and Disposal Items.

Always leave a space between each Moving Item or Removal and Disposal Item even if it requires using more than one sheet.

The columns designated "Location" should be filled out showing the location of the item by the station and the distance and whether to the left or right of the centerline.

The column designated "Description" should contain an accurate description of the Moving Item or Removal and Disposal Items. The "Work To Be Done" column should accurately describe exactly what is to be done with the item and in a fashion that the contractor fully understands what work is expected.

On the proposal the contractor receives, the only thing that is shown is the Moving Item number and Location. It is very important that the "Description" and "Work To Be Done" columns are completed as accurately as possible.

The column designated "Unit" will always contain the initials L. S. (Lump Sum) and the column designated "Owner" should contain the property owner name.

Reset & new fence shown in a lump sum amount should be shown in the General Construction Note and on the Summary of Estimated Quantity Sheet. New fence for a specific location should be shown on the plans and on the Summary of Estimated Quantity Sheet.

Underground storage tanks will need to be set up as "Removal and Disposal Items". They may be combined with other "Removal and Disposal Items" on the same tract, but must contain their own location (station number and offset Lt. or Rt.), accurate description (example: 10,000 Gallon Kerosene Tank) and "Work To Be Done" (remove and dispose of tank according to DHEC regulations). They will be plotted as accurately as possible on the plan sheets.

Three additional items will be required and the Right of Way Agent will furnish quantity to Road Design. They are shown on the following page.

Moving items/demolition items will be shown on Moving/Demolition item sheet only. Do not show moving/demolition items on Plan sheets.

Pay Item No.	Description	Quantity
2021200	Removal and Disposal of Tank Contents	Gallon
2021205	Removal and Disposal of Low Level Contaminated Soil	Ton
2021210	Removal and Disposal of High Level Contaminated Soil	Ton

These bid items will be shown in the “General Construction Note” and on the “Summary of Estimated Quantities” Sheet only.

Pay Item 2021200 – for emptying tank
Pay Item 2021205 & 2021210 – for soil adjacent to tank

For examples of this section see Figure 1-E. Also Figure 20-D (Sheet 3-20 (11) in the Highway Design Manual).

PIN NO. 14345

MOVING ITEMS

ITEM NO.	LOCATION FEET-RT.orLT.	LOCATION STATION	DESCRIPTION	WORK TO BE DONE	UNIT	OWNER
				MOVE WOODEN SIGN, WOODEN BORDER, FLOWER BED		
1	LT.	158+00±	WOODEN SIGN, WOODEN BORDER AND FLOWER BED.	AND ALL APPURTENANCES TO CLEAR R/W AND MAKE	L.S.	MARY ANN JONES
				ALL NECESSARY CONNECTIONS.		
2	LT.	224+50±	APPROXIMATELY 40 ASSORTED SHRUBS.	MOVE ALL DESIRABLE SHRUBS TO CLEAR R/W.	L.S.	PARKWAY SOUTH
3	LT.	225+50±	WOODEN SIGN, WOODEN BORDER AND FLOWER BED.	MOVE WOODEN SIGN, WOODEN BORDER, FLOWER BED	L.S.	HOUNDSLAKE GOLF
				AND ALL APPURTENANCES TO CLEAR R/W AND MAKE		
				ALL NECESSARY CONNECTIONS.		
4	RT.	225+50±	WOODEN SIGN WITH ELECTRICAL CONNECTIONS, APPROXI-	MOVE WOODEN SIGN, ALL DESIRABLE SHRUBS, WATER	L.S.	HOUNDSLAKE CORP.
			MATELY 48 ASSORTED SHRUBS, WATER SPIGOT AND	SPIGOT, AND ALL APPURTENANCES TO CLEAR R/W AND		
			APPROXIMATELY 50' OF 1" PVC.	MAKE NECESSARY CONNECTIONS.		

REMOVAL & DISPOSAL ITEMS

FED. RD. DIV. NO.	STATE	COUNTY	FILE NO.	PROJECT NO.	ROUTE NO.	SHEET NO.	TOTAL SHEETS
3	S.C.	AIKEN			S.C.118	2A	

ITEM NO.	LOCATION FEET-RT.orLT.	LOCATION STATION	DESCRIPTION	WORK TO BE DONE	UNIT	OWNER
1	LT.	224+50±	WOODEN SIGN AND WOODEN RETAINING WALL.	REMOVE WOODEN SIGN, RETAINING WALL AND ALL	L.S.	PARKWAY SOUTH
				MATERIALS AND DEBRIS. (SEE R/W SPECIAL PROVISIONS.)		

M2.DGN

FIGURE 1-E

5. Revised Standard Drawings

Throughout the year, Standard Drawings are revised or new ones created. If the change requires immediate attention, the Standard Drawings will be placed in the plans until the annual mailing of all updated Standard Drawings are made. A list of updated or new Standard Drawings will be e-mailed to the plan production employees so that the necessary sheets can be added to the plans, but only when required for clarification. These Standard Drawings can be found in the directory: 'road' on 'Smpsan3'/stdmgr/engrev/.

Also, the Department's website will be updated with the Standard Drawings at the time of the revision prior to the annual mailing. The updated and/or new Standard Drawings on the intranet/internet will be appropriately identified as new or updated.

After the annual mailing of the revised Standard Drawings, the updated/new Standard Drawings will no longer be required to be added to the plans. Between annual mailings, all newly distributed Standard Drawing books will not include the updated or new drawings but will be the same as those books available at the previous annual mailing. The effective letting date will be noted on the revised or new Standard Drawing.

Annual mailings will follow the schedule shown below:

January 15	All revised or new Standard Drawings to be finalized that are to be in the next general mailing.
January 25	Mail all prepared Standard Drawings to Department and FHWA Offices for review.
February 15	Review completed and comments returned to Road Design.
February 28	Minor corrections completed.
March 15	Mail updated or new Standard Drawings to all book holders.

Plan Preparation Guide

Chapter 2

Typical Sections - Pavement Design

1. Typical Sections

Typical sections shall meet the design criteria of the Highway Design Manual and other applicable Memorandums, Instructional Bulletins and Memos.

An example of a blank typical section sheet to be used on all projects is shown in Figure 2-A. The Typical Section Sheet can be found in the border sheet library by the following description:

Directory: g:rd_std
File Name: Sctyp1.dgn

When any changes are made to the Typical Section Sheet throughout the project development process, the revised Typical Section Sheet must be resubmitted to the Pavement Design Engineer for review and approval.

When roadways have a design speed less than 50 mph, Standard Drawing No. 100-6 recommends a maximum superelevation rate of 0.06 foot per foot. This rate is preferred; however, there are conditions that warrant a 0.08 foot per foot maximum superelevation. Generally, on rural secondary roadways the design speed will be 45 mph, but the superelevation rate of 0.08 foot per foot is more desirable than the 0.06 foot per foot that is shown on our standard drawing.

Superelevation is to be calculated at the rate of 0.50% longitudinal gradient per Standard Drawing 100-6 for normal development. However, this rate may vary from 0.50% to a maximum of 0.74% determined on a case by case basis. The longitudinal gradient shall be provided with the curve data to prevent errors and/or misunderstanding by field personnel.

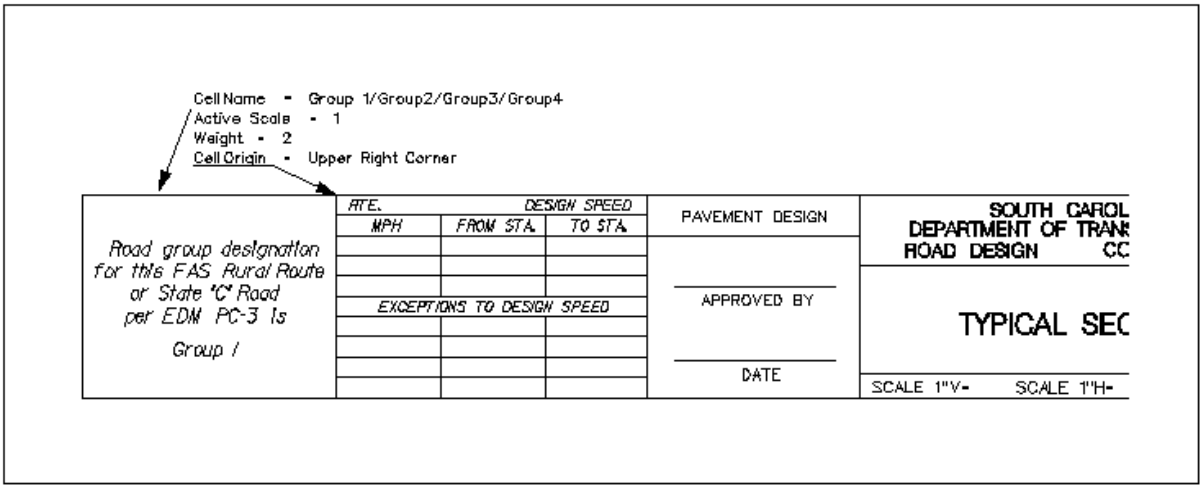
Although the preferred superelevation is shown on the standard drawing, the standard will be revised by adding the note shown below in order to allow the use of all acceptable superelevation rates with the specified design speed. The 0.10 and 0.12 tables will not be used.

Note: The Design Speed and Rates shown on this standard are preferred. They may be varied but must conform to AASHTO publication "Geometric Design of Highways and Streets"

The minimum design speed criteria shall be included on the first typical section sheet only on all projects except "C" (secondary projects). "C" projects are divided into four groups as stated on Engineering Policy Memorandum No. 10. (See Group Coordinator for copy)

When plans are being prepared for either FAS or State 'C' roads, a note is to be added to the Typical Section Sheet noting to which road group the roadway belongs. The road group designation should be indicated by the Project Manager on the Design Plans Field Review (DPFR) Title Sheet at the location provided. If the group designation is not provided on the DPFR Title Sheet, the Design Group Coordinator should determine which road group is applicable and then verify with the Project Manager.

A cell has been created for each group type. They are named GROUP1, GROUP2, GROUP3, and GROUP4. The correct cell should be placed directly left of the Design Speed information block on the bottom right of the Typical Section Sheet. See the example shown below.



The Design Group Coordinator or Assistant Design Group Coordinator is to ensure that the Design Speed and pertinent information is recorded on the Field Review prints. The appropriate project engineer is responsible for the exceptions to the displayed Design Speed.

On projects where two (2) feet of shoulder is to be paved, the typical section should clearly show the "12′ Travel Lane" dimension. See Figure 2-B. In areas of development (residential or business), on all roads whether in an urban or rural location, the Field Review Team will make recommendations of the fill slope and cut back slope ratios in curb and gutter and ditch sections respectively. The Field Review team will evaluate slopes with respect to Right-Way-Acquisition, significant tree policy, and property owner management of grassed areas. Slopes may be varied to fit specific situations adjacent to the roadway; however, continuity should be considered when selecting slope rates. In general, the fill and cut back slopes will be 2:1 unless revised during the Field Review. Where there are only a few developed areas when the slopes can be flattened, a note describing the isolated areas on the typical section sheet will be adequate, unless additional right of way is required.

The travel lane dimension shall also show on valley gutter sections. The "Lip" on valley gutter sections shall be shown on a 10:1 cross slope. The earth shoulder portion of a valley gutter section shall be 3 ft. on a 30:1 slope unless otherwise shown on the Field Review. See Figure 2-C. The back-lip of a Valley Gutter Section on the high side of superelevation should follow the superelevation rate. As the valley is in transition, valley grades must be checked in order to insure positive drainage.

On typical sections with sidewalk (slope of sidewalk 50:1) in locations of high pedestrian traffic, particularly in the area of schools, consideration has been given to requiring curb and gutter adjacent to sidewalk in all instances thus precluding a valley gutter with sidewalk section. However, this concept remains unwritten.

If Field Review plans are submitted recommending a valley gutter with sidewalk for the typical section, please make certain either the Project Development Engineer or the Preliminary Design/Secondary Road Engineer has approved the proposed concept by initialing and dating the proposed design. Their approval shall be required, and/or obtained, prior to proceeding with plans preparation.

Numbers shall show on the line drawing portion of the typical section to indicate the items in the pavement structure and a corresponding legend showing the items shall show on the bottom left of the sheet. See figures 2-B, 2-C and 2-D.

Typical Sections are to show type of mix in pavement design. (See Guidelines for Hot Mix Asphalt Selection)

2. Secondary ("C" project) Typical Sections

The Department's design standards shall be those contained in the South Carolina Highway Design Manual.

The only exception to this policy shall be for Federal Aid Secondary and State Secondary, (C) Projects where the following typical section elements will be the minimum standard, other than urban or subdivision streets:

1. Right of way width - 66′ (33′ / 33′)
2. Pavement width - 22′
3. Normal pavement crown slope – 48:1
4. Shoulder width - 6′ (9.5′ where guardrail is required)
5. Shoulder slope – 12:1
6. Distance to ditch line from centerline - 22′
7. Ditch front slope – 4:1 for 6′ or less; 6:1 for greater than 6′
   * See Typical Section note for variance of this slope for drainage.
8. Minimum cut or fill slope-2:1
9. Design speed – 55 mph (maximum)

Typical sections which provide for valley gutters or curbs and gutters shall be permitted in urban areas or subdivisions. Right of way widths of 50 feet minimum shall be acceptable in these areas. Design speeds in these areas shall be appropriate for existing or anticipated development.

It shall be required that the roadway (from Construction Line to Construction Line) be cleared and all improvements removed from the right of way. In compliance with state laws, all areas disturbed during construction and shoulders and slopes shall be seeded to obtain permanent vegetation for controlling erosion. Seeding shall be in accordance with the Standard Specifications for Highway Construction (2000) and as specified on the Field Review.

On secondary typical sections, show the full shoulder on a 12:1 slope and the drops from finished grade in feet as illustrated in figure 2-D

3. Base Course

On projects where widening the existing pavement with the same material for base as the overlay (usually asphalt concrete surface course), do not use an extra 6" of base material beyond the edge of the surface course.

On projects where widening with a different material than the overlay use an extra 6" of width for the base course beyond the edge of the surface course.

Asphalt Aggregate Base Course shall be used on all projects that are widened 6' or less.

Sand Clay Base Course. Unless specifically requested otherwise and agreed upon during the Field Review, the contractor shall be required to furnish all materials and incidentals required to construct Sand Clay Base Courses in accordance with Section 303 of the Standard Specifications. To avoid problems during contract preparation and administration, all roads in a contract for which a Sand Clay Base is to be constructed shall have identical source requirements. The Project Engineer shall have the authority to approve necessary changes to ensure uniformity in the contract.

Sand Clay Base Course shall be used unless otherwise specified on the Field Review.

Graded Aggregate Base Course. When the Field Review recommends Graded Aggregate Base Course, the Contract shall not include alternate except for the following counties; Darlington, Dillon, Florence, Georgetown, Horry, Marion, Marlboro, and Williamsburg. Coquina Shell Base will be used as an alternate in these counties.

Earthwork quantities in the plans are for Graded Aggregate Base Course. If Coquina Base is selected, the grades will be adjusted in the field to compensate for the difference in base thickness, and quantities for "Unclassified Excavation" and "Borrow Excavation" will be adjusted prior to final payment. The following note will be placed on the General Construction Note Sheet when Coquina Base Course is used.

> **Earthwork quantities in the plans are for the base alternate of Graded Aggregate Base Course. When Coquina Shell Base is to be placed, then the Department's field office will adjust the grade of the subgrade to compensate for the additional thickness. Quantities for "Unclassified Excavation" and "Borrow Excavation" will also be adjusted prior to final payment,**

Prime will be required to be calculated and added to the list of estimated quantities for projects using Graded Aggregate Base Course and Sand Clay Base Course. The rate will be 0.27 gallons per S.Y. When computing the Square Area, include the entire width of the base course. The pay item will be "Prime Coat" computed in gallon and the BAMS number is 4010005.

When setting up quantities of base material for drives in the inclusions, use only the term "Graded Aggregate Base Course" in lieu of stating all three alternates. The depth of base material will continue to be shown in the inclusions.

4. Full Depth Asphalt Patching

Full Depth Asphalt Pavement Patching has been revised to limit the depth of patching to 4", 6", and 8" Uniform. Problems have been incurred in the curing and compaction of the asphalt mix in the deeper patches.

5. Maintenance of Roadway and Drives During Construction

When material is needed to maintain traffic on the roadway or on driveways during construction, the bid item "Maintenance Stone" given in tons will be used. The selection of a specific aggregate for maintenance stone will not be made by the Department. Also, when full depth patching is required, quantity for maintenance stone (25 Tons per 100 S.Y.)

6. Curb Ramps

Curb Ramp notes, where applicable, shall be shown on the curb and gutter typical sections. The note shall read "Curb ramps are to be constructed in accordance with Standard Drawing 720-6". See Figure 2-E for a typical curb and gutter section. Also see page 2-7 for information about detectable warnings applicable to curb ramps.

7. Mill-in Rumble Strips

Mill-in Rumble Strips shall be used on all projects where there is a paved four foot or wider shoulder. This will include both the inside and outside shoulder where a paved four to ten foot shoulder is used. Mill-in Rumble Strips will not be used on a ramp, acceleration or deceleration lanes. A note will be placed on the plan sheet showing "Begin Mill-in Rumble Strip" and "End Mill-in Rumble Strip" with an arrow to the appropriate location. (See Special Drawing No. 100-4A).

8. Asphalt Weight and Thickness

Below is a table of conversion factors for the weight and thickness of asphalt base and surface courses.

Table of Conversion Factors from Lbs/SY to Equivalent Inches

TYPE OF MATERIAL	APPROX. LBS/SY 1" THICK	EQUIV. INCHES PER 100 LBS/SY
Asphalt Concrete Surface Course	105.0	0.95
Asphalt Concrete Binder Course	105.0	0.95
Bit. Stabilized Macadam Base Cr.	105.0	0.95
Asphalt Aggregate Base Course	105.0	0.95

9. Pavement Designs

Pavement designs are requested by Design Groups in Road Design when required by roadway projects. The Pavement Design Engineer at the Research and Materials Laboratory completes the design and distributes it through the State Materials Engineer. As the Design Group develops typical sections for the project, the most current pavement design available will be used to establish the materials and rates to show on the Typical Section Sheet. The accuracy of the interpretation of the pavement design is very important to the success of its implementation during the construction phase and the life of the roadway. Therefore, when the Typical Section Sheet is prepared, a plan size original is to be sent to the Pavement Design Engineer at the Research and Materials Laboratory for review and approval. Upon signing and dating each Typical Section Sheet, the sheets are returned to the Design Group to be incorporated into the plans.

Quality Control Review worksheets for design field review plans, right-of-way plans, final construction plans, and the combination worksheet for right-of-way/construction plans have been amended to incorporate the check of the pavement design approval and date. Any Typical Section Sheet that has a pavement design approval date over three years old must be brought to the attention of the Pavement Design Engineer for a review and the Typical Section Sheet resigned and dated.

The Design Group Coordinators are requested to notify the Road Design Engineer whenever a concrete pavement is being considered as a final riding surface so that the Department can evaluate the life cycle cost, the availability of trained construction personnel, and the most current concrete design specifications.

The form entitled “Request For Traffic Data” follows. Under the heading “DATA REQUESTED:” a new line has been added called “Classification Count for Pavement Design”. In the future, when traffic data is needed for a pavement design and a more accurate count of the trucks and other vehicular traffic is desired, then the person filling out the form will check, both, the top line “Traffic Loading for Pavement Design” and the second line “Classification Count for Pavement Design”. If only a traffic loading count is wanted without the classification count then only the top line is checked.

If the second line is not checked, a historical truck count will still be provided as in the past. In all cases, the “Future ADT” under “Controls” should be requested for a 20 year forecast. The “Request For Traffic Data” form is to be sent to the Office of Traffic Counts in Traffic Engineering.

Projects that are described in the STIP by route/road number will require the additional classification count. Other projects will be reviewed on a project by project basis. Guidelines for these other type projects are:

1) The project is on a primary route.
2) The road/route has an unusually high ADT.
3) The road/route is in a particularly high growth area.

If it is unclear whether or not to do a classification count, one should be requested.

If the percent of trucks is all that is desired then only the second line “Classification Count for Pavement Design” will be checked and the usual location map is provided by the requestor.

Secondary roads typically do not have a formal pavement design developed for them. If a secondary road anticipates high growth or an inordinate number of trucks, then a pavement design may be needed, and a classification count will need to be requested with the traffic loading data in order to perform a pavement design.

At the time a Traffic Data Request is made, a Pavement Design Request with location map should be sent to the Pavement Design Office at the Research Materials Laboratory. The Traffic Data will be forwarded to the Pavement Design Office when it is obtained. Attached is a Pavement Design Request Form that should be used to request a new pavement design. This new form is available for electronic submittal of your pavement design request. The location map may also be sent in MicroStation format to the Pavement Design Office.

If pavement designs are three or more years old prior to the project being let to contract, then a "Request for Traffic Data" will be submitted to Traffic Engineering. The updated traffic data will then be sent to the Pavement Design Engineer so the pavement design can be reviewed and adjustments made to the original pavement design. A Pavement Design Request Form with a location map should be sent to the Pavement Design Office to request a review of an existing pavement design. When a review is requested, the original pavement design with the project's signed typical section sheets are to be sent to the Pavement Design Office in order to provide a thorough review. At the right of way plans stage, all projects with a pavement design should have their pavement designs checked for the date completed. If the three year period will end near the scheduled letting date of the project then the pavement design should be reviewed with newly acquired traffic data.

10. Detectable Warnings

The American with Disabilities Act requires that detectable warnings now be incorporated in the surface of all curb ramps. All projects with curb ramps will require a new pay item of "Detectable Warning Surface" in the plans beginning with the May 2004 Highway Letting. Projects such as resurfacing, etc. when new ramps may not be constructed, the existing ramps will need to be retrofitted with the detectable warning surface. Measurement and payment will be by the square foot.

Generally, detectable warnings are to cover the full width of the ramp on the walking path directly adjacent to the street within 6" to 8" of the curb line extending away from the curb for 24". This application along with others are demonstrated on the new Standard Drawing 720-7 entitled "Detectable Warning Surface".

A special provision in the proposal will note the application of the new "Detectable Warning Surfaces" stating the two types that can be installed, cast-in-place and surface mounted. Contractors can choose whichever type they want to install. When necessary to retrofit to existing ramps, the surface mounted type should be used since no concrete work will be paid to retrofit the detectable warning surfaces on an existing ramp.

All surfaces of detectable warning surfaces are to provide a visual contrast with the adjacent walking surfaces. The Department has selected the color of all Detectable Warning Surfaces to be "safety yellow".

.Form No. 2079
(Revised 6-15-01)

Route to Chief of Data Services

REQUEST FOR TRAFFIC DATA

DATA REQUESTED:

- [ ] Traffic Loading for Pavement Design
- [ ] Classification Count for Pavement Design
- [ ] Design Data
- [ ] Intersection Two-Way Traffic Flow (ADT)
- [ ] Intersection Turn Movements
- [ ] Other (Explain) _____

_____

LOCATION: COUNTY _____ ROUTE/ROAD _____

From _____ To _____
(ATTACH MAP)

CONTROLS:

For Pavement Loading

	Year	ADT
Base Year	_____	_____
Middle Year	_____	_____
End Year	_____	_____
No. of Lanes	_____	
Pavement Type		_____
Rigid		_____
Flexible		_____
Road Group		_____
Lane Distribution		_____
Trucks (% ADT)		_____

For Design

	Year	ADT
Present ADT	( )	_____
Future ADT	( )	_____
Design Speed (V)	____	_____
K%_____ D%_____		
Trucks		
% ADT_____		
% DHV_____		
Other_____		
_____		
_____		
_____		

FURNISH COPIES OF TRAFFIC DATA TO:

- [ ] Environmental Coordinator
- [ ] Road Design Engineer
- [ ] Bridge Design Engineer
- [ ] Project Manager
- [ ] Project Development Engineer
- [ ] Research & Materials Lab

Requested By: _____
Section: _____
Date: _____

03/11/2002

PAVEMENT DESIGN REQUEST

Date Sent _____
to P.D.
(Mail or Email)

Date Received _____
by P.D.

New Pavement Design _____ or Pavement Design Review _____

Road Design Group Coordinator / Program Manager: _____

Road/Route: _____ Intersection Roads: _____
(List all over 500 LF) _____

From: _____ _____

To: _____ _____

_____

County: _____ _____

Type of Construction: _____

WE - Widening with Earth Median
WPC - Widening with Paved Median about Centerline
WPV - Widening with Paved Median, Variable
NL - New Location *
Other - Please Explain *

* Perform comparison of Flexible vs Rigid Pavement Design _____(Yes/No)

Brief Description of Proposed Work: _____

_____

Project Length: _____

Date Plans & Map Sent: (Mail / Email) _____

Comments: _____

Traffic Counts Requested? _____(Yes/No) Classification Count Requested? _____(Yes/No)

Date Design Needed: _____

Charge Code: _____

File Number: _____ Pin Number: _____

Proposed Letting Date: _____

Comments: _____

_____

FED.AID. PROJ. NO.	STATE	COUNTY	FILE NO.	ROAD/ROUTE NO.	SHEET NO.
3	SC.				

TYPICAL SECTION OF IMPROVEMENT
SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

RTE.	DESIGN SPEED	
MPH	FROM STA.	TO STA.
EXCEPTIONS TO DESIGN SPEED		

PAVEMENT DESIGN

APPROVED BY

DATE

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
ROAD DESIGN COLUMBIA, S.C.

TYPICAL SECTION

SCALE 1"V= SCALE 1"H= RTE./RD.

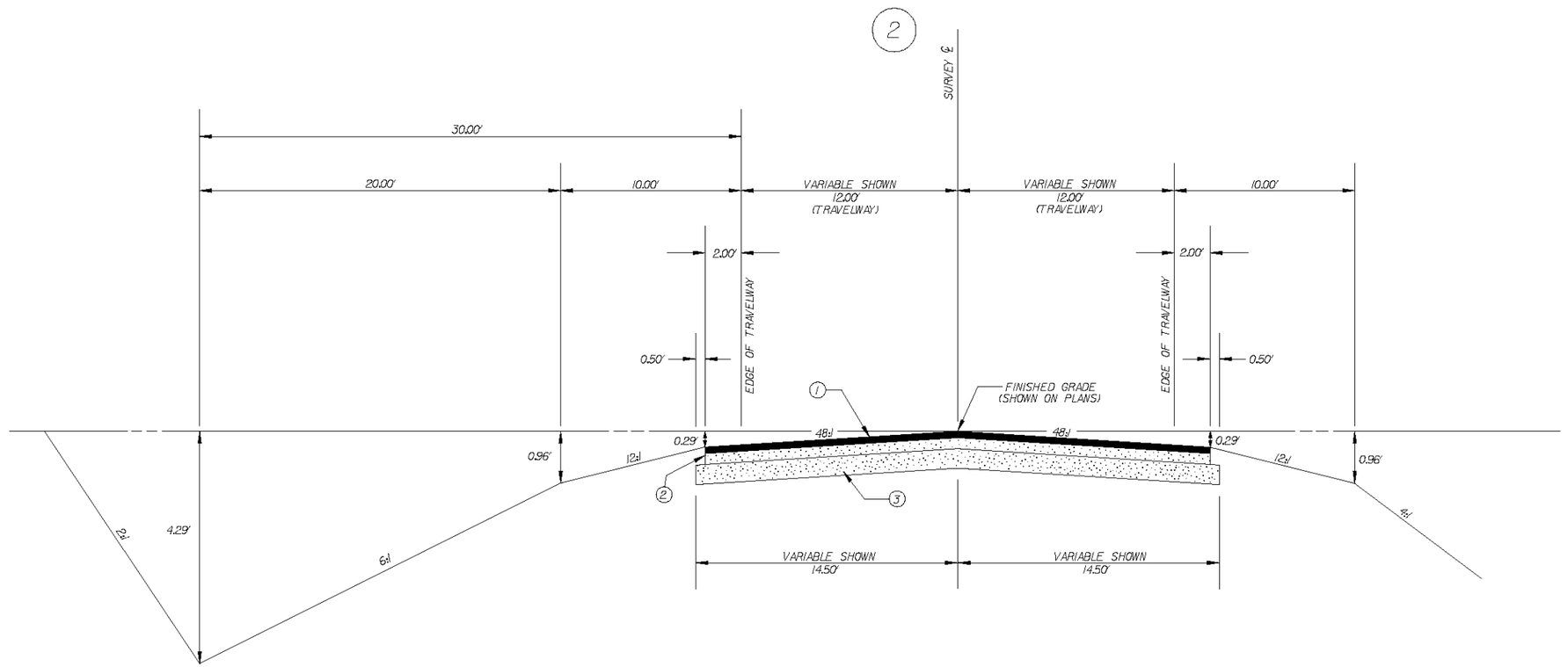
FIGURE 2-A

RDSQD3B
ZGA3(67,141)R12045PF.DGN

PIN NO.12045

FIGURE DWG. NO.	STATE	COUNTY	FILE NO.	ROAD/ROUTE NO.	SHEET NO.
1	SC.	MARLBORO	35.513	15/401	3A

TYPICAL SECTION OF IMPROVEMENT
SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.



USE THIS SECTION ON U.S. RTE. 15/401
FROM STA. 426+00 ± TO STA. 436+00 ±

NOTE:

1. ALL DIMENSIONS AND PAVEMENT DESIGNS ARE DETERMINED BY INDIVIUAL PROJECTS.

2. FILL SLOPES
   6:1----0' TO 5' FILL
   4:1----5' TO 10' FILL
   2:1----OVER 10' FILL
IF 2:1 SLOPE IS USED, WIDEN SHOULDER 3.5' FOR GUARDRAIL

① ASPHALT CONCRETE SURFACE COURSE (150 LBS. PER S.Y.)
② ASPHALT CONCRETE BINDER COURSE (250 LBS. PER S.Y.)
③ ASPHALT AGGREGATE BASE COURSE (450 LBS. PER S.Y.)

RTE.	DESIGN SPEED	
MPH	FROM STA.	TO STA.
55	426+00	436+00
EXCEPTIONS TO DESIGN SPEED		

PAVEMENT DESIGN

APPROVED BY

DATE

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
ROAD DESIGN COLUMBIA, S.C.

TYPICAL SECTION

SCALE 1"V= SCALE 1"H= RTE./RD.

scbyp1.dgn

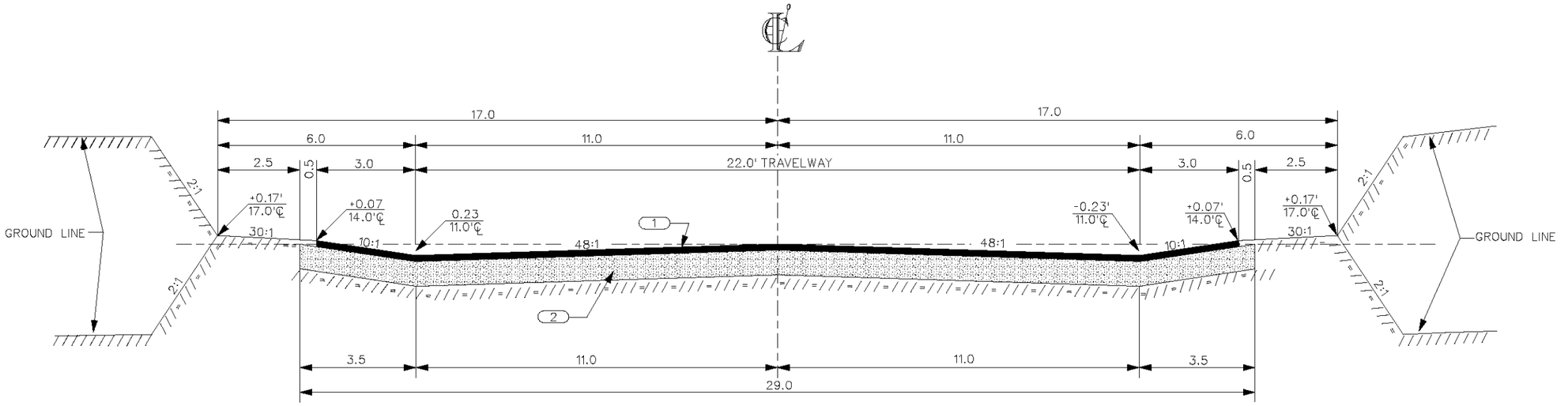
FIGURE 2-B

RDSD22D
ZFA2:(S2,2243R11B79TY.DGN

FED.RTE. OR NO.	STATE	COUNTY	FILE NO.	ROAD/ROUTE NO.	SHEET NO.
3	SC.				

TYPICAL SECTION OF IMPROVEMENT
SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

28.0' VALLEY GUTTER SECTION



USE THIS SECTION ON
RD. S-274 FROM STA. 0+12.2 TO STA. 21+34.5

LEGEND

(1) ASPHALT CONCRETE SURFACE COURSE (125 LBS. PER SY)

(2) GRADED AGGREGATE BASE COURSE (6" UNIFORM)

NOTE:
ALL DIMENSIONS AND PAVEMENT DESIGNS
ARE DETERMINED BY INDIVIUAL PROJECTS

	RTE. DESIGN SPEED		
	MPH	FROM STA.	TO STA.
Road group designation for this FAS Rural Route or State "C" Road per EDM PC-3 is Group I	35	0+12.2	21+34.5
	EXCEPTIONS TO DESIGN SPEED		

PAVEMENT DESIGN

APPROVED BY

DATE

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
ROAD DESIGN COLUMBIA, S.C.

TYPICAL SECTION

SCALE 1"V= SCALE 1"H= RTE./RD.

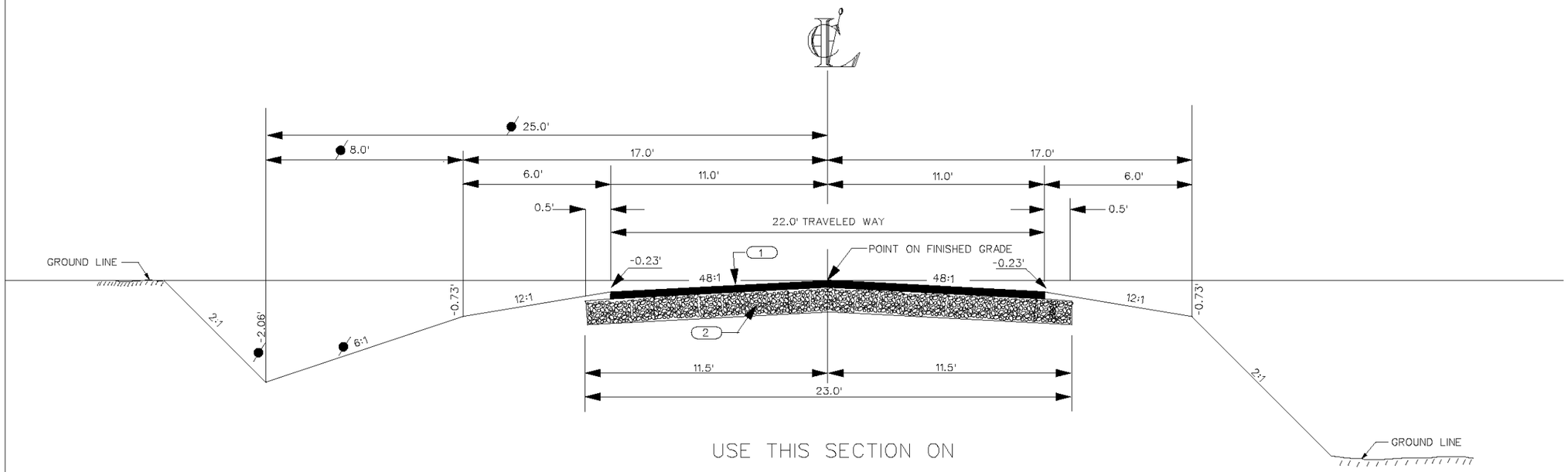
sctypt.dgn

R0500d2d
ZGA3(67,123)
R12982TY.DGN

FED.RD. DIV.NO.	STATE	COUNTY	FILE NO.	ROAD/ROUTE NO.	SHEET NO.
3	SC				

TYPICAL SECTION OF IMPROVEMENT
SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

34'-50' SECTION



USE THIS SECTION ON
ROAD S-927 FROM STA. 0+10.0 TO STA. 88+74.0

NOTE:

● THIS SLOPE MAY BE VARIED WHEN A DEEPER DITCH IS NECESSARY FOR DRAINAGE PURPOSES, USING A MINIMUM SLOPE OF 12:1 AND A MAXIMUM SLOPE OF 4:1. WHERE A DEEPER DITCH THAN PROVIDED BY A 4:1 IS NECESSARY, THE DITCH SHALL BE PLACED FARTHER FROM THE ℄ CONTINUING THE 4:1 SLOPE TO PROVIDE FOR THE NECESSARY DEPTH. SEE PROFILE FOR THE SPECIAL DITCH GRADES.

LEGEND

(1) ASPHALT CONCRETE SURFACE COURSE (125 LBS. PER SY)

(2) GRADED AGGREGATE BASE COURSE

RTE.	DESIGN SPEED	
MPH	FROM STA.	TO STA.
55	0+10	88+74
EXCEPTIONS TO DESIGN SPEED		

PAVEMENT DESIGN

APPROVED BY

DATE

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
ROAD DESIGN COLUMBIA, S.C.

TYPICAL SECTION

SCALE 1"V= SCALE 1"H= RTE./RD.

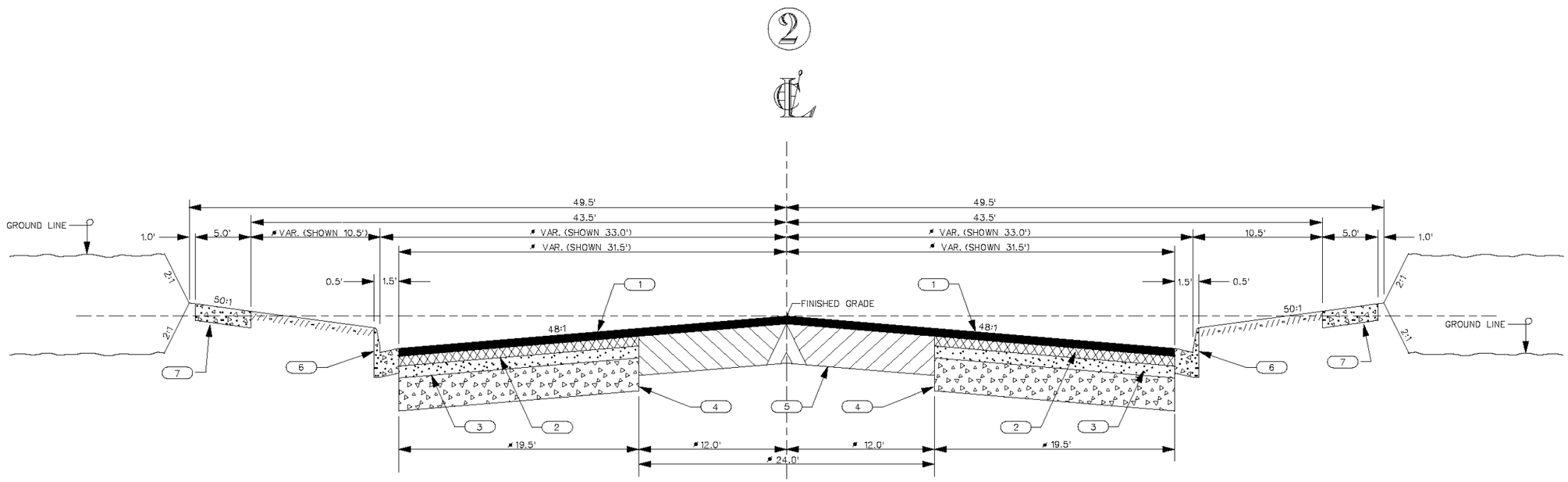
scitypl.dgn

FIGURE 2-D

RDSOD2C
ZFA\SC\2223\R6303TY.DGN

FED.RD. DIV.NO.	STATE	COUNTY	FILE NO.	ROAD/ROUTE NO.	SHEET NO.
3	S.C.				

TYPICAL SECTION OF IMPROVEMENT
SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.



USE THIS SECTION ON
ROAD S-37 (RED BANK ROAD) FROM: STA. 21+24.2 TO: STA. 57+50.0

LEGEND

1	ASPHALT CONCRETE SURFACE COURSE (200 #/S.Y.)
2	ASPHALT CONCRETE BINDER COURSE (250 #/S.Y.)
3	ASPHALT AGGREGATE BASE COURSE COURSE (300#/S.Y.)
4	GRADED AGGREGATE BASE COURSE
5	RETAIN PAVEMENT IN PLACE
6	2.0' CONCRETE CURB AND GUTTER (MOUNTABLE)
7	5.0' CONCRETE SIDEWALK (4" UNIFORM)

NOTES: SEE STANDARD DRAWING NO. 720-1 FOR DETAIL OF MOUNTABLE CURB AND GUTTER (2'-0").
SEE STANDARD DRAWING NO. 720-5 FOR DETAIL OF CONCRETE DRIVEWAYS.
CURB RAMPS ARE TO BE CONSTRUCTED IN ACCORDANCE WITH STANDARD DRAWING NO. 720-6.
VARIABLE BASE AND SURFACING IN PLACE, TO BE RETAINED FROM STA. 49+00 TO STA. 57+50. SEE PLANS AND CROSS SECTIONS.
ALL DIMENSIONS AND PAVEMENT DESIGNS ARE DETERMINED BY INDIVIUAL PROJECTS.

RTE. S-37	DESIGN SPEED	
MPH	FROM STA.	TO STA.
45	0 + 50.0	67 + 35.2
EXCEPTIONS TO DESIGN SPEED		

PAVEMENT DESIGN

APPROVED BY

DATE

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
ROAD DESIGN COLUMBIA, S.C.

TYPICAL SECTION

SCALE 1"V= SCALE 1"H= RTE./RD.

sctyp1.dgn

FIGURE 2-E

PROPOSED GUIDELINES FOR HOT MIX ASPHALT SELECTION

TYPE COURSE	TYPE FACILITY						
	INTERSTATE	**HEAVY DUTY PRIMARY (INCLIUDES ALL NHS ROUTES)**	**PRIMARY & HIGH VOLUME SECONDARY**	**LOW VOLUME SECONDARY ROUTES 1500 VPD OR LESS**		**SPECIAL APPLICATION**	
SURFACE	12.5 mm SUPERPAVE 1/2" MAX (12.5 MM) MIN. RATE 175 #/SY	TYPE - 1C MIN RATE 150 #/SY	TYPE - 1 MIN RATE 150 #/SY	TYPE - 3 MIN RATE 150 #/SY	TYPE - 4 MIN RATE 125 #/SY	OGFC MIN RATE 65 #/SY	TLSC MIN RATE 40 #/SY
	FINE & COARSE CRUSHED AGGR. REQUIRED	FINE & COURSE CRUSHED AGGR. REQUIRED	FINE & COURSE CRUSHED AGGR. REQUIRED	UNCRUSHED GRAVEL AND LOCAL SAND PERMITTED	UNCRUSHED GRAVEL AND LOCAL SAND PERMITTED	COURSE CRUSHED AGGR. REQUIRED	FINE AGGREGATE MUST BE SCREENINGS
LIQUID ASPHALT BINDER	5.1%	5.3%	6.2%	6.0%	6.3%	6.5%	6.50%
INTERMEDIATE	19.0 mm SUPERPAVE 3/4" MAX (19 MM)	BINDER TYPE -1	BINDER TYPE -2				
	FINE & COARSE CRUSHED AGGR. REQUIRED	FINE & COARSE CRUSHED AGGR. REQUIRED	UNCRUSHED GRAVEL AND LOCAL SAND PERMITTED				
LIQUID ASPHALT BINDER	4.30%	5.00%	5.10%				
ASPHALT AGGREGATE BASE	ASPHALT AGGREGATE BASE CR. TYPE -1		ASPHALT AGGREGATE BASE CR. TYPE -2			HMA SAND ASPHALT BASE TYPE 3	
	FINE & COARSE CRUSHED AGGREGATE REQUIRED.		UNCRUSHED GRAVEL AND LOCAL SAND PERMITTED			FINE AGGREGATE MUST BE SCREENINGS	
LIQUID ASPHALT BINDER	4.2%		4.3%			5.70%	
LEVELING AND BUILD-UP BASE	SURFACE SUPERPAVE OR TYPE -1 OR TYPE -1C BINDER TYPE - 1 ASPHALT AGGREGATE BASE COURSE TYPE - 1		SURFACE TYPE -1, TYPE -3, TYPE -4, OR TYPE -5 BINDER TYPE -2 ASPHALT AGGR. BASE COURSE TYPE -2 (PERMITTED)				
ANTI STRIP	ADD HYDATED LIME : REQUIRED		ADD HYDRATED LIME (REQUIRED) - EXCEPT AS NOTED BELOW			ADD HYDATED LIME : REQUIRED	

NOTES:

1. NO RECYCLED ASPHALT PAVEMENT (RAP) ALLOWED IN 12.5 MM SUPERPAVE OR OGFC MIX.
2. SUPERPAVE 1/2" MAX. (12.5 mm) AND OGFC REQUIRE A PG 76-22 POLYMER MODIFIED BINDER.
3. LIQUID ASPHALT BINDER IS THE PERCENTAGE USED FOR QUANITITY CALCULATIONS FOR LIQUID ASPHALT BINDER IN PAVING MIXTURES.
4. SCREENINGS ARE REQUIRED IN SAND ASPHALT BASE COURSE T-3.
5. HYDRATED LIME REQUIRED IN ALL MIXES EXCEPT SURFACE TYPE - 4.
   SURFACE COURSE TYPE -4 WOULD ALLOW LIQUID ANTI-STRIP ADDITIVE, EXCEPT WHERE USED ON LEVELING ON PRIMARY & HIGH VOLUME SECONDARY. HYDRATED LIME IS REQUIRED IN SURFACE COURSE TYPE -4 BEING USED AS A LEVELING COURSE ON PRIMARY AND HIGH VOLUME SECONDARY ROUTES.
6. CRUSHED AGGREGATE IS DEFINED AS AN AGGREGATE HAVING TWO OR MORE MECHANICALLY INDUCED FRACTURED FACES ON LEAST 90 % BASED ON COUNT, OF THE MATERIAL RETAINED ON THE NO. 4 SIEVE.

REV. 1-20-05

PLAN PREPARATION GUIDE

CHAPTER 3

QUANTITY COMPUTATIONS AND INFORMATION

1. General Quantities

This chapter covers quantity computations and general quantity information that is not covered in the Highway Design Manual or that needs clarification. Quantities are covered in Section 3, Chapter 19 of the Design Manual.

2. Maintenance of Roadway and Drives During Construction

When material is needed to maintain traffic on the roadway or on driveways during construction the bid item "Maintenance Stone" given in tons will be used. The selection of a specific aggregate for maintenance stone will not be made by the Department. The Pay Item shall be 3069900 Maintenance Stone ------Ton

3. Liquid Asphalt Binder in Paving Mixture

A Quantity for Liquid Asphalt Binder shall be included for asphalt paving mixtures. Below are the values recommended computing quantities:

Type Asphalt Mix	Recommended % AC
1C Surface Cr.	5.3%
1B Surface Cr.	5.0%
1 Surface Cr.	6.2%
Type 3 Surface Cr.	6.0%
4 & 5 Surface Cr.	6.3%
Type 1 Binder Cr.	5.0%
Type 2 Binder Cr.	5.1%
Type 1 Asph. Agg. Base Cr.	4.2%
Type 2 Asph. Agg. Base Cr.	4.3%
Surface for Shoulders	6.0%
Superpave Surface Course	5.1%
Superpave Intermediate Course	4.3%

Example of Calculation:

1273 Tons of ACSC (Type 1) x 6.2% = 79 Tons Liquid Asphalt Binder

The Pay Item Shall Be:

4011004	Liquid Asphalt Binder PG 64-22 -------- Ton
4011008	Liquid Asphalt Binder PG 76-22 -------- Ton
4011010	Liquid Asphalt Binder PG 82-22 -------- Ton

"Liquid Asphalt Binder PG 64-22" will be used in all cases unless otherwise instructed.

4. Sand-Clay Base Course

The contractor shall be required to furnish all materials and incidentals required to construct Sand-Clay Base Course. No Type is to be specified.

The Pay Item Shall Be:

3031006	Sand Clay Base Course - 6" Uniform _____ S.Y.
3031008	Sand Clay Base Course - 8" Uniform _____ S.Y.
3031010	Sand Clay Base Course - 10" Uniform _____ S.Y.
3031012	Sand Clay Base Course - 12" Uniform _____ S.Y.

Example of Calculation:

Sta. 0+11.0 To Sta. 29+04.0 = 2893' x width (29') ÷9 = 9322 S.Y.
Inclusions For Dives 100 S.Y.
Total 9422 S.Y.

5. Graded Aggregate Base Courses

Graded Aggregate Base Course. When the Field Review recommends Graded Aggregate Base Course, the Contract shall not include alternate except for the following counties; Darlington, Dillon, Florence, Georgetown, Horry, Marion, Marlboro and Williamsburg. Coquina Shell Base will be used as an alternate in these counties.

Earthwork quantities in the plans are for Graded Aggregate Base Course. If Coquina Base is selected, the grades will be adjusted in the field to compensate for the difference in base thickness, and quantities for "Unclassified Excavation" and "Borrow Excavation" will be adjusted prior to final payment. See note to be placed on General Construction Note Sheet in Chapter 2, Page 4, concerning Coquina Shell Base.

Example of Calculation:

Sta. 0+13.0 To Sta. 55+52.0 = 5539'
5539 (Length) x 23 (Width) ÷ 9 = 14,155 SY
Inclusions For Drives = 750 SY
Total = 14,905 SY

6. Hot Mix Asphalt Base Course

The rate of application for Asphalt Aggregate Base Course shall be given on the Field Review or Pavement Design.

Sta. 0+13.0 To Sta. 55+52.0 = 5539'
5539' (Length) x 23 (Width of base) ÷ 9 = 14,155 SY
14,155 SY x 800 (Lb. per SY) ÷ 2000 = 5662 Tons

The Pay Item Shall Be:
Hot Mix Asphalt Aggregate Base Course (Type ____) _____ Ton

7. Hot Mix Asphalt Binder Course

The rate of application for Binder Course shall be given on the Field Review or pavement design.

Example of Calculations:

Sta. 0+13.0 To Sta. 55+52.0	=	5539'
5539' (Length) x 22' (Width of binder) ÷ 9	=	13,540 SY
13,540 SY x 225 (Lb. per SY) ÷ 2000	=	1,523 Tons
Binder Course For Build –Up	=	50 Tons
Additional Quantity To Cover Overruns 5%	=	79 Tons
Total		1652 Tons

The Pay Item Shall Be:

Hot Mix Asphalt Concrete Binder Course (Type _____) _____ Ton

8. Hot Mix Asphalt Surface Course

The rate of application for surface course shall be given on the Field Review or Pavement Design.

Example of Calculation:

Sta. 0+13.0 To Sta. 55+52.0	=	5539’
5539’ (length) x 22 (Width of Surface) ÷ 9	=	13,540 SY
13,540 SY x 175 (Lb. Per SY) ÷ 2000	=	1,185 Tons
Inclusions For Drives	=	66 Tons
Additional Quantity to Cover Overruns 2%	=	25 Tons
Total	=	1,276 Tons

The pay item shall be:
Hot Mix Asphalt Concrete Surface Course (Type ___) _____ Tons

9. Bituminous Surfacing

The type of Bituminous Surfacing for surface course shall be given on the Field Review or pavement Design.

Example of Calculation:

Sta. 0+11.0 To Sta. 29+04.0	=	2893’
2893’ (Length) x 28’ (Width of Surfacing) ÷ 9	=	9000 SY
inclusions For Drives	=	500 SY
Total	=	9500 SY

The pay item shall be:

Bituminous Surfacing (____ Treatment) Type ___ ____ S.Y.

10. Prime Coat

Prime coat will be required when using Graded Aggregate Base course or sand clay base course. The rate will be 0.27 gallon per square yard.

Example of Calculations
1000 S.Y. x 0.27 GAL = 270 gallons

The pay item shall be:
4010005 Prime Coat _____ GAL.

11. Riprap at Bridge Ends

Example of Calculations:

A= 529.81 + 2.0 = 531.81
B= 516. 0 - 2.0 = 514.0
C= 545.0
D= 2:1 Slope = 2

$A= (531.81 – 514.0)^2 + (531.81 – 514.0 \times 2)^2 = (17.81)^2 + (35.62)^2 =$
$317.20 + 1268.78 = 1585.98 = 39.824$

$R= \frac{[\ (531.81 – 514.0)}{2} + (545.0 – 531.81)\ ] =$
$(8.91 + 13.19) = 22.1 \times 2 = 44.2$

$\times=2\ \frac{(3.14)\ (44.2)}{4} = \frac{(6.28)\ (44.2) = 69.39}{4}$

Area Of RIPRAP = [2 (30) + 2(69.39) + 41] 39.824 =

$(60 + 138.78 + 41)\ 39.824 = 239.78 \times 39.824 =$

$\frac{9549\ S.F. \times 1}{27} = 353.7\ C.Y.$

$\frac{353.7 \times 3400}{2000} = 601\ TONS$

601×2 (No. of Approaches) * = 1202 TONS

* When both approaches are of equal height. When approaches are a different height each approach is to be figured separately.

The pay item shall be:

8041020 Hand Placed Riprap _____ TONS

Pay Items to be Used for Rip-Rap in Accordance with the Rip-Rap Classifications Found in Section 804 of the 2000 Edition of the "Standard Specifications for Highway Construction".

Pay Item No.	Description	Unit
8041010	RIP-RAP (CLASS A)	TON
8041015	RIP-RAP (CLASS A)	CY
8041020	RIP-RAP (CLASS B)	TON
8041025	RIP-RAP (CLASS B)	CY
8041030	RIP-RAP (CLASS C)	TON
8041035	RIP-RAP (CLASS C)	CY
8041040	RIP-RAP (CLASS D)	TON
8041045	RIP-RAP (CLASS D)	CY
8041050	RIP-RAP (CLASS E)	TON
8041055	RIP-RAP (CLASS E)	CY
8041060	RIP-RAP (CLASS F)	TON
8041065	RIP-RAP (CLASS F)	CY

The following criteria should be used to determine which Class of Rip-Rap should be used:

Criteria	New Pay Item Number to use
Hand Placed Rip-Rap is computed by Design Group	8041020 or 8041025
Dumped Rip-Rap is computed by Design Group	8041030 or 8041035
Rip-Rap is provided by another source	As specified by other source
Hand placed Rip-Rap is currently shown on plans	Change to 8041020 or 8041025
Foundation Rip-Rap is currently shown on plans	As specified by other source
Dumped Rip-Rap is currently shown on plans	Change to 8041030 or 8041035

All notes in the plans pertaining to rip-rap should be revised accordingly. An example is shown below:

Old Note:

"PLACE 20 TONS OF HAND PLACED RIP-RAP"

New Note:

"PLACE 20 TONS OF RIP-RAP (CLASS B)"

12. Geotextile For Erosion Control Under RipRap

Geotextile for erosion control is to be used under all Riprap. The Class should be determined by the project engineer or Hydraulics Engineer, but in most cases will be class 2. The type is to be determined by the map shown on page 3-14 . Type D is a site specific type in both class of geotextile and will be used only in critical / severe applications. More site specific information will be given in the special provisions of the proposal when type D is specified and needs to be brought to the specifications & estimates manager attention. The AOS and permittivity must be obtained either from pavement design or LAB. The Pay Item shall be:

ITEM NO. DESCRIPTION UNIT

8048100 Geotextile for Erosion Control Under Riprap (Class1) m2 (SY)

8048105 Geotextile for Erosion Control Under Riprap (Class 1) m2 (SY)

8048110 Geotextile for Erosion Control Under Riprap (Class 1) m2 (SY)

8048115 Geotextile for Erosion Control Under Riprap (Class 1) m2 (SY)

8048200 Geotextile for Erosion Control Under Riprap (Class 2) m2 (SY)

8048205 Geotextile for Erosion Control Under Riprap (Class 2) m2 (SY)

8048210 Geotextile for Erosion Control Under Riprap (Class 2) m2 (SY)

8048215 Geotextile for Erosion Control Under Riprap (Class 2) m2 (SY)

13. Borrow Excavation

When a project has 25 CY or less of borrow it will be classified as "Unclassified Excavation". When there is 26 CY or more of borrow the item of "Borrow Excavation" will be used. Computation of borrow excavation will be 200 CY per mile for secondary roads and 400 CY per mile for primary roads on resurfacing projects.

The Borrow Excavation Supplemental Specification requires the top 8” of subgrade to be modified with Portland cement at a specified rate in select counties of the state.

Counties		**Percentage of Portland cement to be used to modify the top eight inches of the subgrade.**
•Abbeville	•Fairfield	5%
•Chester	•Saluda	
•Edgefield	•Union	
•Greenville	•Newberry	6%
•Laurens	•Oconee	
•McCormick	•Pickens	
•Anderson	•Lancaster	7%
•Cherokee	•Spartanburg	
•Greenwood	•York	

The subgrade is defined as the area between lines 18" outside the area to be occupied by the pavement structure extending to the outside edge of curb and gutter and sidewalk, where applicable. Please see the Borrow Excavation Supplemental Specification (11-03-03) for more details.

When any section of the roadway is constructed with borrow excavation then the entire length of roadway subgrade will be improved with Cement Modified subbase (8"). Whenever Cement Modified subbase is specified, it will be measured and paid as described in Section 301 of the Standard Specifications. All projects are potentially affected by this specification with certain limitations.

The chart show below identifies when cement modified subbase (8") is required in those counties described above:

<table>
<tr><th>Subgrade Area</th><th>Borrow Excavation</th><th>Pavement Design</th><th>Cement Modified Subbase</th></tr>
<tr><td rowspan="4">≥ 8000 SY Subgrade</td><td rowspan="2">With borrow</td><td>Yes</td><td>Yes</td></tr>
<tr><td>No</td><td>Yes</td></tr>
<tr><td rowspan="2">Without borrow</td><td>Yes</td><td>No</td></tr>
<tr><td>No</td><td>Yes</td></tr>
<tr><td rowspan="4">< 8000 SY Subgrade</td><td rowspan="2">With borrow</td><td>Yes</td><td rowspan="4">No except where superpave is used</td></tr>
<tr><td>No</td></tr>
<tr><td rowspan="2">Without borrow</td><td>Yes</td></tr>
<tr><td>No</td></tr>
</table>

Any project that is not to have its subbase modified, but has other criteria such as high truck/industrial traffic, known poor soil conditions, special traffic control situations, etc. may warrant cement modified subbase. In these cases, the designer should consult with the Geotechnical Materials Engineer at the Office of Research and Materials.

The designer will place the pay items of Cement Modified Subbase (8" Uniform) and Portland Cement for Cement Modified Subbase on the inclusion sheet with the explanation that the quantities are due to the borrow excavation supplemental specifications. These pay items of Borrow Excavation/Cement Modified Subbase are not considered to be part of the pavement design and will not be placed on the typical section sheet. For applicable projects in the affected 18 counties, the designer will use 115 pounds per cubic foot for the weight of soil to determine the estimated quantities as described in the South Carolina Highway Design Manual.

14. Fine Grading

The item of "Fine Grading" has been placed in all plans that include pay items of "Unclassified Excavation", and/or "Borrow Excavation" where work is necessary to bring earth material into final shape. The pay unit is square yards. Calculate the plan quantities of Fine Grading for all subgrade areas including side roads. Only those drives shown on the plans will be included in the estimated quantities. The quantity of Fine Grading will be the area of subgrade extending laterally 18 inches beyond the pavement structure.

The Contractor will be paid the plan quantity unless the fine grading area is changed as discussed in the Fine Grading Supplemental Specification. Place the pay item only on the "Summary of Estimated Quantities" sheet. The "Fine Grading" pay item will not be used when the earthwork is measured and paid for as "Site Excavation" or "Station Grading". Also, "Fine Grading" will not be used on resurfacing projects where the shoulder is being brought-up to grade to match the adjacent pavement.

15. Seeding and Sodding

Seeding types, mulched or unmulched, and sodding shall be determined by the field party on the Field Review. Special types of seeding shall also be determined on the Field Review. Computation of permanent vegetation will be 3.0 MSY per mile for secondary roads and 4.7 MSY per mile for primary roads on primary projects. The permanent vegetation will replace existing seeding quantities including seeding, fertilizer, lime, and nitrogen.

There will be no separate quantity for fertilizer and lime when specifying any type of sprigging or sodding on a project. When sprigging and sodding grass are pay items, fertilizer and lime will be included in the bid price for sprigging or sodding. Fertilizer and lime for sprigging will be applied in accordance with Section 812 of the Standard Specifications. Fertilizer and lime for sodding will be applied in accordance with Section 810 of the Standard Specifications. A special provision will be included in the proposal to modify the measurement and payment sections of the Standard Specifications.

The pay items for sprigging and sodding are shown below:

8121000	Sprigging	MSY
8122000	Sprigging – Centipede Grass	SY
8122100	Sprigging – Centipede Grass	MSY
8131000	Sodding	SY
8132000	Sodding – Centipede Grass	SY
8132100	Sodding – Centipede Grass	MSY
8133000	Sodding – Zoyzia Grass	SY

16. Temporary Seeding

Projects should include a quantity for temporary seeding. This inclusion is necessary since the NPDES regulations require all disturbed areas to be seeded within seven days. The Project Managers shall determine the amount of seeding required at the time the Field Review is performed (25%, 50% of permanent seeding, etc.).

17. Mowing

Mowing will be used on all projects except bridge replacement projects. Also, other projects which have only a small quantity of seeding may not need a mowing quantity. These projects will be identified on the Field Review and a decision made whether or not to include mowing. Quantities will be determined by the amount of total seeding and / or sodding in the plans including temporary seeding

The pay item shall be: 8109900 Mowing _____ MSY

18. Removal and Disposal of Existing Asphalt Pavement

Removal and Disposal of existing asphalt pavement will be measured and paid for by the square yard. All existing asphalt pavement to be removed, 2" or greater, will be measured and paid for. Less than 2" shall be paid for as Unclassified Excavation.

The pay item shall be:

2025000 Removal & Disposal of Existing Asphalt Pavement _____ SY

19. Removal and Disposal of Existing Pavement

Removal and disposal of existing pavement shall include concrete pavement, concrete sidewalk, stone or concrete curbs, concrete curb and gutter, and brick sidewalk. For further information, see section 202.05 in the Standard Specifications for Highway Construction (2000).

The pay item shall be:

2023000 Removal & Disposal of Existing Pavement _____ SY

20. Concrete Driveway

When concrete sidewalk is called for on a project with driveways, a quantity for Concrete Driveway (6" Uniform) shall be included for all drives. See Standard Drawings 720-5 and 720-5A for details.

21. Brick Masonry-Reinforced Brick Masonry

This procedure should be used when a brick masonry wall has been selected by the Project Team. When the top of a brick masonry wall has elevation breaks, the top can be contoured to give the top of wall a pleasing contoured look at the request of the District Engineering Administrator. During the Design Field Review, the type and design of the brick wall will be selected from the Standard Drawings 718-1, 718-2 and 718-2A. Whenever a wall is desired, the Design Group will request a review of the selected design by the Roadway Structural Group. The Roadway Structural Group will verify the use of the proposed brick wall and may request the Research and Materials Lab to provide soil borings, if deemed necessary. After the Roadway Structural Group verifies the design, the Design Group will complete calculating the quantities for the selected wall. See Standard Drawings 718-1, 718-2 and 718-2A for details. If the selected wall does not meet the design conditions shown on the Standard Drawings (e.g. over 10' high or extraordinary live or dead loads), the Design Group will use a wall designed by the Roadway Structural Group.

Examples of Calculations:

BRICK WALL 400 L.F. Long
4' Height
12" Wide

Assume back slope is level ➔ Case 1

Brick Masonry

$400' \times \frac{12"}{12"} \times 4'$ = $400 \times 1 \times 4$ = 1600 CF

Total Brick Masonry = 1600 CY x $\frac{1\ CY}{27\ CF}$ = 59.26 CY

Concrete Class 3000
From table on Standard Drawing 718-1, use 3' - 2" for footing width

$400' \times 3' - 2" \times \frac{10"}{12"}$ = $400 \times 3.167 \times 0.833$ = 1055 CF

$400' \times \frac{2.75"}{12"} \times \frac{8"}{12}$ = $400 \times 0.299 \times 0.607$ = + 61 CF

Total Class 3000 Concrete = 1116 CF x $\frac{1\ CY}{27\ CF}$ = 41.34 CY

1. REINFORCED BRICK WALL
400 L.F. LONG
5' Height
12" Wide

Assume back slope is less than 4:1 ➔ Case 1

Brick Masonry (Reinforced)

$400' \times \frac{12"}{12"} \times 5'$ = 2000 CF x $\frac{1\ CY}{27\ CF}$ = 74.08 CY

Concrete Class 4000
From table on Standard Drawing 718-2, select 3' - 6" for footing width - No Key

$400' \times 3' - 6" \times \frac{12"}{12"}$ = $400 \times 3.5 \times 1$ = 1400 CF

$400' \times \frac{2.75"}{12"} \times \frac{8"}{12"}$ = $400 \times 0.229 \times 0.667$ = + 61 CF

Total Class 3000 Concrete = 1461 CF x $\frac{1\ CY}{27\ CF}$ = 54.11 CY

Grout and reinforcing steel used in the wall and foundation will be as shown on the Standard Drawings and no separate quantities calculated.

22. Erosion Control Blanket

All bridge projects, regardless of size, will have the pay item "Temporary Erosion Control Blanket" included in the estimated quantities. The quantities will be calculated to include the entire fill slopes adjacent to the bridge back to the termini of the project or to a cut section. Areas to be rip rapped will not be included in the quantity for "Temporary Erosion Control Blanket". Where the roadway grade is 2.5% or greater, a quantity of "Temporary Erosion Control Blanket" will be computed to cover the roadway ditches to a minimum width of ten feet (5' each side of the bottom of the ditch) in the cut sections within the projects limits.

The Hydraulic Engineering Section will determine when permanent ditch lining is necessary. Their determination will be based upon soil types , ditch flow velocities, ditch slopes, and sheer stress. There are 2 Specs of permanent mats.

Beginning with all projects in the August 2004 Highway Letting, the Rolled Erosion Control Products Supplemental Specifications will be in effect. Changes to pay items are as follows: (Note the changes in units)

Old Pay Item		
8151100	Permanent Erosion Control Mat – Standard	SY
8151105	Permanent Erosion Control Mat – Heavy Duty	SY
New Pay Item		
8151101	Permanent Turf Reinforcement Matting (Type 1)	MSY
8151102	Permanent Turf Reinforcement Matting (Type 2)	MSY
8151103	Permanent Turf Reinforcement Matting (Type 3)	MSY
8151104	Permanent Turf Reinforcement Matting (Type 4)	MSY
Old Pay Item		
8151110	Erosion Control Blanket	SY
New Pay Item		
8151111	Temporary Erosion Control Blanket (Class A)	MSY
8151112	Temporary Erosion Control Blanket (Class B)	MSY
8151113	Temporary Erosion Control Blanket (Class C)	MSY

23. Reinforced Concrete Box Culvert

Quantities necessary for plans for R.C box culvert are as following:
2041000 Structure Excavation for Culvert ____ C.Y.
7011500 Concrete for Structures-4000P ____C.Y.
7031100 Reinforce Steel for Structures (Roadways) ____ LBS

24. National Pollution Discharge Elimination System (NPDES)

The disturbed area on a project shall be shown in acres on the Title Sheet in a box labeled NPDES. The acreage shall be determined by multiplying the length of project by the width of the Construction Line/Right-of-way less any existing pavement to be retained. If construction slopes extend beyond the R/W line, this area will be added along with outfall ditches and drainage that extend beyond the mainline R/W. Existing dirt roadbed and dirt shoulders will not be included in the disturbed area. An example of the NPDES line is shown in Chapter 12.

Example of Calculation:

3120’ (Length of project) × 66 (R/W Width) ÷ 43,560	=	4.727 AC
Outfall Ditch 300’ (Length) 30’ (Width) ÷ 43,560	=	0.207 AC
Construction Slopes (Run with Planimeter) 360 ÷ 43,560	=	0.008 AC
S. Total	=	4.942 AC
Less Existing Pvt. 450’ × 22’ ÷ 43,560	- =	0.227 AC
Total NPDES	=	4.715 AC

25. Guardrail End Treatment

All projects that have guardrail end treatments will be identified in the plans as an “End Treatment --- Type T”. The Contractor will select a terminal listed on the “Approval Sheet” for “End Terminal ---Type T” maintained by the Research and Materials Engineer. Currently, two terminals are listed on the “Approval Sheet”. They are the ET-2000 and SKT-350.

The Pay Item Shall Be:

8052300 End Terminal ---Type T Each

26. Pavement Markings for Bridge Plans

All bridge projects that require road plans to be developed by Road Design will include pavement markings in the Estimated Quantities. Pay items will generally be those listed below. A Standard Drawing is being developed by Traffic Engineering. Unless the road is particularly complex, the pavement markings will be determined by the Design Group. If assistance is needed, please contact Traffic Engineering.

The Pay Items Shall Be:

6011010	Paint 4″ White Solid Lines (Pvt. Edge Lines)	4” Solid white lines will be determined by doubling the total length of the project
6012005	Paint 4″ Yellow Broken Lines (Gaps Exc.)	Half the total project length will be 4” broken yellow. Compute quantity by taking ½ the total approach length then divide by 4. Result divisible by 10.
6012010	Paint 4″ Yellow Solid Lines (Pvt. Edge & No Passing Zone)	Half the total project length will be double yellow on the centerline. Compute 4” solid yellow by taking ½ times the total approach length and doubling
6033005	Permanent Yellow Pavement Markers Bi-Dir, Refl. 4″ x 4″ (For Projects with D.S. over 45 MPH or if existing roadway has Pavement Marking in place at time of Field Review)	Raised pavement markers will be placed on the centerline where they are currently installed or on projects with a design speed over 45 MPH. See Standard Drawings to determine quantity

27. Paving Under Guardrail

Paving under guardrail has been authorized on Interstate and selected Primary Projects. When this is used, it must comply with Standard Drawing No. 403-2. The cost of this practice will be reviewed periodically to determine its continuance.

The Pay Items shall be:

2031000 Unclassified Excavation_____C. Y.
2033000 Borrow Excavation_____C. Y.
4037100 Hot Mix Asphalt Concrete Plant Mix Under Guardrail_____S. Y.

See page 13-1 for paving under guardrail on bridge replacement projects.

28. Quality Control by Contractor

Beginning with the May 2004 Highway Letting, the following pay items will be included in all plans that require the contractor to provide sampling and testing for earthwork construction, base, and subbase construction and/or concrete construction:

1061100	Quality Control for Earthwork	LS
1061200	Quality Control for Bases and Subbases	LS
1061300	Quality Control for Concrete	LS

The decision to use a "Quality Control" pay item will be made during the Design Field Review (DFR) by those representing the District Construction Office. A revised DFR Title Sheet has been prepared showing these items. The name of the new DFR Title Sheet is dfrts3.dgn and can be seen on page 5-7. This pay item will be placed on the "Summary of Estimated Quantities" sheet.

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION

FED. RD DIVNO.	STATE	COUNTY	FILE	PROJ.	NO.	SHEET NO.	TOTAL SHEETS
3	S.C.						

SUMMARY OF ESTIMATED QUANTITIES

SECTION	ITEM	INCLUSION	QUANTITY	UNIT
1031000	MOBILIZATION			L.S.
1071000	TRAFFIC CONTROL			L.S.
2011000	CLEARING AND GRUBBING WITHIN RIGHT-OF-WAY			L.S.
2013000	CLEARING AND GRUBBING MATERIAL PITS			ACRE
2022000	REMOVAL AND DISPOSAL ITEM NO. ( ) - ( )			L.S.
2023000	REMOVAL AND DISPOSAL OF EXISTING PAVEMENT			S.Y.
2024100	REMOVAL AND DISPOSAL OF EXISTING CURB			L.F.
2031000	UNCLASSIFIED EXCAVATION			C.Y.
2033000	BORROW EXCAVATION			C.Y.
2034000	MUCK EXCAVATION			C.Y.
2035000	STATION GRADING			STA.
2041000	STRUCTURE EXCAVATION FOR CULVERTS			C.Y.
2061000	EMBANKMENT IN PLACE			C.Y.
2071000	OVERHAUL			CYHM
2091000	SELECT MATERIAL FOR SHOULDERS AND SLOPES			C.Y.
ALT.	GRADED AGGREGATE BASE COURSE CHECK ALTERNATES AS APPROPRIATE			
3021000	SOIL AGGREGATE SUBBASE COURSE (AGG. NO. CR-14)			
3022000	AGGREGATE NO. CR-14			TON
3031 00	SAND CLAY BASE COURSE (TYPE)			C.Y.
3033000	SCARIFYING, MIXING, REMIXING, SHAPING, AND RESHAPING			
				M.S.Y.
3041 00	COQUINA SHELL BASE COURSE (UNIFORM)			S.Y.
3051 00	MACADAM BASE COURSE (UNIFORM)			S.Y.
				S.Y.
3061 00	STABILIZED AGGREGATE BASE COURSE - TYPE			
3063 00	FOSSILIFEROUS LIMESTONE BASE COURSE (UNIFORM)			S.Y.
3069900	MAINTENANCE STONE			TON
309	HOT LAID SAND ASPHALT BASE COURSE (TYPE)			TON
310	HOT LAID ASPHALT AGGREGATE BASE COURSE			TON
4011000	ASPHALT CEMENT IN PAVING MIXTURE			TON
40120	FULL DEPTH ASPH. PAVEMENT PATCHING (UNIFORM)			S.Y.
402	HOT LAID ASPH. CONC. BINDER COURSE (TYPE)			TON
403	HOT LAID ASPH. CONC. SURF. COURSE (TYPE)			TON
4037000	HOT LAID ASPH. SURF. COURSE FOR DITCH PAVING			TON
40 00	BITUMINOUS SURFACING (TREATMENT) TYPE			S.Y.
5011 00	PORTLAND CEMENT CONCRETE PAVEMENT (UNIFORM)			S.Y.
5012 00	PORTLAND CEM. CONC. PAVMT. FOR RAMPS (UNIFORM)			S.Y.
6051005	PERMANENT CONSTRUCTION SIGNS			S.F.
7011 00	CONCRETE FOR STRUCTURES (CLASS A)			C.Y.
7031100	REINFORCING STEEL FOR STRUCTURES (ROADWAY)			LBS.
7062100	TREATED TIMBER CUT-OFF WALLS			L.F.

SECTION	ITEM	INCLUSION	QUANTITY	UNIT
7141111	12" R.C. PIPE CULVERT - CLASS			L.F.
7141112	15" R.C. PIPE CULVERT - CLASS			L.F.
7141113	18" R.C. PIPE CULVERT - CLASS			L.F.
7141114	24" R.C. PIPE CULVERT - CLASS			L.F.
7141115	30" R.C. PIPE CULVERT - CLASS			L.F.
7141116	36" R.C. PIPE CULVERT - CLASS			L.F.
7141117	42" R.C. PIPE CULVERT - CLASS			L.F.
7141118	48" R.C. PIPE CULVERT - CLASS			L.F.
7142	X R.C. PIPE CULVERT TEE (CLASS)			EACH
7143	X R.C. PIPE CULVERT WYE			EACH
7144	R.C. PIPE CULVERT BEND ° (CLASS)			EACH
7170150	15" RELAID PIPE CULVERT			L.F.
7170180	18" RELAID PIPE CULVERT			L.F.
7170	RELAID PIPE CULVERT			L.F.
7181000	BRICK MASONRY			C.Y.
7182000	BRICK MASONRY (REINFORCED)			C.Y.
7191	CATCH BASIN - TYPE			EACH
7191	CATCH BASIN - TYPE			EACH
7191	CATCH BASIN - TYPE			EACH
7192	DROP INLET			EACH
7192105	MANHOLE			EACH
71922	JUNCTION BOX			EACH
7192300	SPRING BOX			EACH
7196000	EXTRA DEPTH OF BOX			L.F.
7197110	ADJUSTED CATCH BASIN			EACH
7197120	ADJUSTED MANHOLE			EACH
7197130	ADJUSTED DROP INLET			EACH
71981	CATCH BASIN (TYPE) CONVERTED			EACH
7198	JUNCTION BOX (CONVERTED			EACH
7201000	CONCRETE CURB (9"X 15")			L.F.
7202	CONCRETE GUTTER -TYPE			L.F.
7203	CONCRETE CURB AND GUTTER			L.F.
7204100	CONCRETE SIDEWALK (4" UNIFORM)			S.Y.
7205 0	CONCRETE DRIVEWAY (" UNIFORM)			S.Y.
7206000	CONCRETE MEDIAN			S.Y.
7211000	BITUMINOUS CURB			L.F.
7221	PRECAST CONCRETE BOX CULVERT (X)			
	AASHTO M- -FH			L.F.

SECTION	ITEM	INCLUSION	QUANTITY	UNIT
8011055	AGGREGATE UNDERDRAIN			C.Y.
8011	AGGREGATE UNDERDRAIN (AGGR. NO.)			C.Y.
80211	PIPE UNDERDRAIN			L.F.
80212	PERFORATED PIPE UNDERDRAIN			L.F.
8034	PIPE SLOPE DRAIN			L.F.
8035000	METAL INTAKE SPILLWAY ASSEMBLY			EACH
8041100	HAND PLACED RIPRAP			TON
8043100	DUMPED RIPRAP			TON
8048 00	GEOTEXTILE FABRIC FOR SLOPE PROTECTION - CLASS			S.Y.
8048200	GEOTEX./EROS. CONTROL UNDER RIPRAP (UNPROTECTED) - CL. 2			S.Y.
8051100	STEEL BEAM GUARDRAIL			L.F.
8051110	REMOVAL OF EXISTING GUARDRAIL			EACH
8051300	STEEL BEAM GUARDRAIL (THRIE)			L.F.
8051900	RESET GUARDRAIL			L.F.
8052110	END ANCHOR - TYPE A			EACH
8052210	END ANCHOR - TYPE B			EACH
8052220	END ANCHOR - TYPE B THRIE BEAM			EACH
8052500	REMOVAL OF END ANCHORS			L.F.
8052600	THRIE BEAM GUARDRAIL BRIDGE CONNECTOR			EACH
80581	CONCRETE MEDIAN BARRIER (TYPE)			L.F.
8058900	CONCRETE BARRIER EXTENSION			
8059	TEMPORARY CONCRETE BARRIER			L.F.
8061	WOVEN WIRE FENCE (TYPE)			L.F.
8062	STRAND BARBED WIRE FENCE			L.F.
8063	CHAIN LINK FENCE			L.F.
806	GATE			EACH
8071000	RESET FENCE			L.F.
8072000	RESET CHAIN LINK FENCE			L.F.
8081000	MOVING ITEMS ( ) - ( )			L.S.
8091000	RIGHT-OF-WAY MARKER			EACH
8092000	RESET RIGHT-OF-WAY MARKER			EACH
8101000	SEEDING (MULCHED)			M.S.Y.
8102100	SEEDING (UNMULCHED)			M.S.Y.
8103000	TEMPORARY SEEDING			M.S.Y.
8104100	FERTILIZER (10-10-10)			TON
8105000	LIME			TON
8106000	NITROGEN			LBS.
8131000	SODDING			S.Y.
8151000	FIBERGLASS ROVING			S.Y.
8152000	BALED STRAW			BALE
8153000	SILT FENCE			L.F.
8154000	SILT BASINS			C.Y.
8158000	TERRACING			L.F.

SUMMARY OF MILEAGE

FILE NO.								
ROUTE OR ROAD NO.								
END OF PROJECT STATION								
BEG. OF PROJECT STATION								
LENGTH IN STATION								
EQUALITIES ±								
	FEET	MILES	FEET	MILES	FEET	MILES	FEET	MILES
GROSS LENGTH OF PROJECT								
LENGTH OF EXCEPTIONS								
NET LENGTH OF PROJECT								
NET LENGTH OF BRIDGES								
NET LENGTH OF ROADWAY								

STATION TO STATION	EQUALITIES			
TOTAL VALUE				

STATION TO STATION	EXCEPTIONS (LENGTH IN FEET)			
TOTAL LENGTH				

STATION TO STATION	BRIDGES (LENGTH IN FEET)			
TOTAL LENGTH				

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION

SUMMARY OF ESTIMATED QUANTITIES

PIN # _____ ITEM # _____ ROAD ROUTE _____

COUNTY _____

FILE NUMBER _____ F.A.P. PROJ. NO. STATE PROJ. NO. _____

FROM: _____

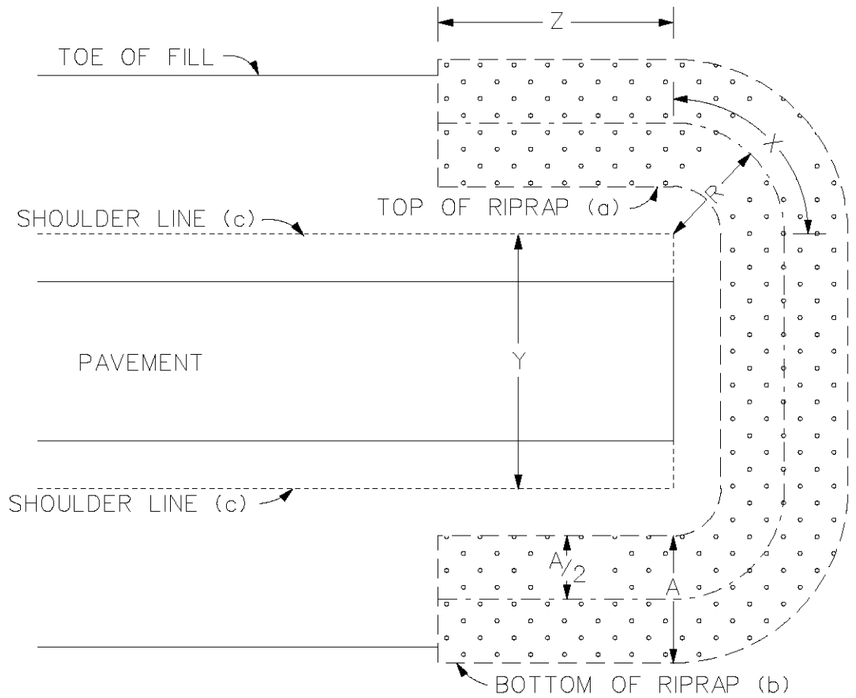
TO: _____

INDEX OF SHEETS

SHEET NO.	SHEET DESCRIPTION	SHEET SUBTOTAL

10. RIPRAP

METHOD OF COMPUTING RIPRAP



a = TOP OF RIPRAP = ELEV. OF HIGH WATER + 2.0 FT.
b = BOTTOM OF RIPRAP = ELEV. OF GROUND LINE - 2.0 FT.
c = ELEV. OF SHOULDER LINE
d = SLOPE OF FILL

$X = \frac{2 \pi R}{4}$

Y = SHOULDER TO SHOULDER WIDTH
Z = 2 TIMES HEIGHT OF FILL OR 30' MIN.

$A = \sqrt{(a - b)^2 + (a - b \times d)^2}$

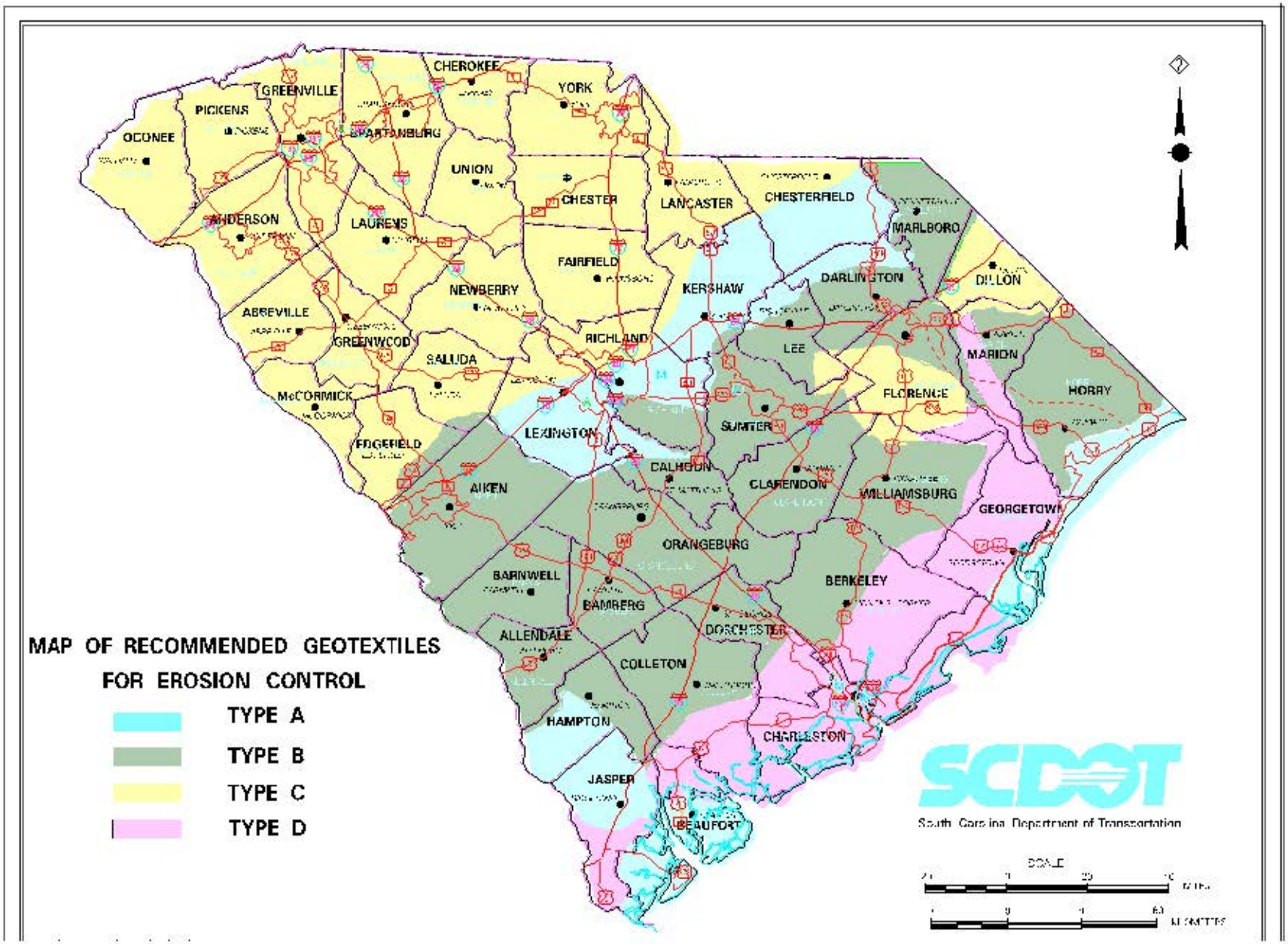
$R = \left[\frac{(a - b)}{2} + (c - a)\right] \times d$

AREA OF RIPRAP = (2Z + 2X + Y) x A = SQ. FT.

C. Y. OF RIPRAP = $\frac{\text{SQ. FT. x 1' (DEPTH OF RIPRAP)}}{27}$

TONS OF RIPRAP = $\frac{\text{C. Y. x 2800 (LBS. PER C. Y.)}}{2000}$

SEE FOLLOWING SHEET FOR EXAMPLE OF COMPUTING RIPRAP


MAP OF RECOMMENDED GEOTEXTILES
FOR EROSION CONTROL
TYPE A
TYPE B
TYPE C
TYPE D
CHEROKEE
YORK
GREENVILLE
PICKENS
SPARTANBURG
OCONEE
UNION
CHESTER
LANCASTER
CHESTERFIELD
MARLBORO
ANDERSON
LAURENS
FAIRFIELD
KERSHAW
DARLINGTON
DILLON
NEWBERRY
ABBEVILLE
GREENWOOD
SALUDA
RICHLAND
LEE
MARION
McCORMICK
FLORENCE
HORRY
EDGEFIELD
LEXINGTON
SUMTER
CALHOUN
CLARENDON
AIKEN
WILLIAMSBURG
GEORGETOWN
ORANGEBURG
BARNWELL
BERKELEY
BAMBERG
DORCHESTER
ALLENDALE
COLLETON
HAMPTON
CHARLESTON
JASPER
BEAUFORT
SCDOT
South Carolina Department of Transportation
SCALE

Plan Preparation Guide

Chapter 4

Special Drawings – Construction Notes
Miscellaneous Notes

1. Special Drawings

A special drawing is a drawing that cannot be considered standard to all projects, but is tailored to a particular situation on a project. Some commonly used special drawings that are stored in standard manager files are shown below:

Survey Codes Legend (Special Drawing 100-A)
Sound Barrier Wall (Special Drawing 709-A)
Standard for Replacing Pavement on Backfill
Over Pipe in Existing Roadways (Special Drawing 714-A)
Guardrail Application At Bridge With Sidewalk (Special Drawing 805-9B)

See figures 4-A, 4-B, 4-C, and 4-D for examples of the above sheets.

Some other special drawings for specific situations that need detailing are retaining walls, box culverts, large drainage boxes, etc. Special drawings should be included in the plans and may have special provisions written for them.

Special drawings should have the bid items necessary for construction, where applicable, shown on the drawing.

2. General Construction Notes

The General Construction Note shown on the plans on the "General Construction Note" sheet has been revised. Replace with the new note in all plans beginning with the July 2003 Highway Letting. The new note is located in the cell library. The cell names are "CNOTE1" for an all uppercase version and "CNOTE2" for a mixed case version. Please see figure 4-E for an example of the "General Construction Note" sheet with the new cell.

General construction notes are notes to the Engineer and Contractor that denote quantities or work not otherwise shown in detail on the plans or Standard Drawings.

Construction Notes. The construction note is usually shown on an individual sheet. It communicates instructions and quantities not detailed on the plans. For quantities listed in the inclusions and shown on the General Construction Note Sheet, a brief description of how each item is to be used, should be given. Below is the wording for the three instructional paragraphs. Omit the second paragraph when there is no superelevation on the project.

GENERAL CONSTRUCTION NOTE

The State Highway Engineer must specifically authorize changes involving increased cost of project or changes in alignment. The District Engineering Administrator is permitted under the direction of the State Highway Engineer to authorize minor alterations not in conflict with the standard practices of the Department. Forward information on any proposed changes in alignment to the Columbia Office as soon as possible.

See individual curves on Reference Data Sheet or Plan Sheets for superelevation rate and design speed, as applicable.

The following quantities are not shown in detail on the plans but are included in the Summary of Estimated Quantities and may be adjusted during construction as directed by the Engineer.

End of Note

To avoid errors and/or misunderstandings in construction plans, all items (inclusions) listed on the General Construction Note Sheet will be listed exactly as shown in the Pay Item list. Do not show the bid item number on the General Construction Note Sheet.

Some items listed are self-explanatory but others should be itemized in more detail as shown in the example below:

Asphalt Concrete Binder Course	150 Tons for Build-up 50 Tons for Detours
Maintenance Stone	50 Tons for Drives 50 Tons for Roadway 20 Tons for Pavement Patching

The Scroll will no longer be placed on the General Construction Note Sheet. In its place, there will be a box to list the Project Manager's name and telephone number and the Group Coordinator's name and telephone.

A special note will be inserted to the general construction note sheet:
"Pipe lengths that are shown on the plans are actual lengths calculated along the pipe slope from center of box to center of box. Field adjustments of the actual pipe length may be necessary.

3. Miscellaneous Notes

There are many miscellaneous notes which should be used throughout the plans such as the beginning and ending of such features as curb & gutter, sidewalks, control of access, fences, retaining wall, etc.

Occasionally excavation becomes necessary to construct bridges. This area should be cross-hatched on the profile and a note supplied to estimate the necessary excavation.

Cross Reference Notes. Cross references are useful to direct someone to a supplemental sheet or to a continuation of a survey that runs off the plan sheet. (Example: Candy St. continued on page 7).

Utility Notes. The first plan sheet should contain all necessary information relating to all utilities on the project. The utility notes should be placed in the upper left corner of the first plan sheet. (Example: All power poles and lines owned by SCE&G Co.)

Alternate Pipe Notes. Alternate pipe notes are used on the "General Construction Note" Sheet when alternate pipe is specified on federal aid projects.

Typical Section Notes. Notes showing beginning and ending stations are shown on Typical Section Sheet only. (Example – Use this section on S. C. Route 502 from Sta. 83+47 to Sta. 105+19)

Mucking Notes. Mucking information should be clearly stated on the profile and quantities shown in the inclusions if not calculated from the cross sections. When mucking is shown on the final cross sections, removal line should be depicted as shown on Standard Drawing No. 203-1.

Driveway Notes. When the pavement structure for driveways is different from the structure shown on the typical section, a note stating the driveway structure shall be placed on the General Construction Note Sheet. See figure 4-E for an example.

4. Reclaiming Existing Roadway Notes

Existing Pavement. "Removal and Disposal of Existing Pavement" will be measured and paid for by the square yard in accordance with Section 202 of the Standard Specifications. When the area to be removed goes beyond the construction limits, the area should be identified on the plans. Quantities should be shown in the inclusions on the "General Construction Note" Sheet.

Existing Asphalt Pavement. "Removal and Disposal of Existing Asphalt Pavement" will be measured and paid for by the square yard. All existing asphalt pavement to be removed, less than 2” will be paid for as Unclassified Excavation.

On the plan sheet identify all asphalt pavement to be removed with an arrow and the following note:

"Remove and Dispose Existing Asphalt Pavement"

Show asphalt pavement to be removed outside of construction limits with hatching. Place quantity in inclusions on "General Construction Note" Sheet with the following note:

"All removal and disposal of existing asphalt pavement will be measured and paid for as described in the special provisions."

Bituminous Surfacing. Areas, where the existing bituminous surfacing (not on a stone base) is to be scarified and shaped to drain, will not be measured and paid for separately, but will be included in other items of work. When it is necessary to remove existing bituminous surfacing which is on a stone base, removal of the bituminous surfacing and base will be measured and paid for as "Unclassified Excavation". Quantities should be placed on the "General Construction Note" Sheet with a note referring to the special provisions for the method of measurement and payment. The plan sheet should identify the area of bituminous surfacing to be scarified and shaped, or removed. This will be done by an arrow and note, such as:

- Scarify and shape existing bituminous surfacing.
  _____ *No separate pay for this work

or

- Remove and Dispose existing bituminous surfacing and stone base.
  _____ *Pay Item Number: 203100

Existing Earth Roadway. When it is necessary to reclaim the existing earth roadway, the area outside the construction limits to be scarified, graded to drain and seeded is to be shown by crosshatching. Identify the crosshatched area on the plan sheet with an arrow and the following note:

"Reclaiming Existing Earth Roadway"

5. Document Fees

Road Design is required by statute and the Highway Commission to establish an appropriate fee schedule for copies of records, plans, and any other public documents. All requests for copies of plan sheets made through our Plans Storage Room will require payment in advance by check or cash. All requests for copies of plan sheets brought to the Engineering Reproduction Service by Department personnel for Department use will be provided to the Department employee at no charge. Between the Long Ad and the Highway Letting, request from outside the Department for plans must be handled by the appropriate Program Manager.

The book, "Standard Drawings for Road Construction", must be purchased through the Plan Storage Office. Requests for copies of anything other than plan sheets, standard Drawings and other bound reference books must be made through the Department's Freedom of Information Officers and an appropriated fee determined in order to recover all costs involved in providing the requested documents.

A Schedule of Fees for items associated with Road Design is available from SCDOT. All transactions shall be payment in advance and not on credit in any case. Copies of plan sheets requested by any government entity shall be provided at no charge. Additional copies of plan sheets to a government entity should be paid for in accordance with the 'Schedule of Fees'. Fees for special requests, large orders and other documents for government agencies will be determined on a case-by-case basis.

6. Alternate Pipe Notes

The alternate pipe notes used on the "General Construction Notes" Sheet on Federal Aid Projects are:

Alternate Pipe Selection Notes:

When Corrugated Aluminum Alloy Pipe is selected for use, the diameters will be one standard pipe size larger than Reinforced Concrete Pipe.

Alternate Pipe for sidelines must have each end beveled to match the adjacent slopes. No separate payment will be made for providing these beveled ends.

Corrugated Aluminum Alloy Pipe & Corrugated High Density Polyethylene Pipe for sidlines must have cast in place concrete pads to match the adjacent slopes as shown in Standard Drawing No. 802-1. No separate payment will be made for providing these cast in place concrete pads.

7. Plan Revisions and Construction Changes

A form called "Plan Revision Authorization" will be used to communicate and document all design and project information changes made to the plans after the plans have been sent to Right-of-way. This form will be maintained in the design group's project file. The revisions will be completed by the design group as authorized by the program manager. The revisions will be noted on the respective plan sheets with the date and printed initials of the authorizing program manager applied by the design group. No signatures or hand written initials will be placed on the plan sheets. All revisions authorized by a program manager must be made on a properly executed "Plan Revision Authorization" form.

Changes to plans made available to the Bidders prior to the Highway Letting will be reviewed by the responsible Design Group who will verify that all changes have been made in the CADD files. Revised plan sheets that are to be made available to the Bidders prior to Letting will be provided to the Engineering Reproduction Manager who will incorporate the revised sheets into the plans after the Letting date. Revised plan sheets that are not made available to the Bidders prior to the Letting will not be added to the Bid Plans at any time. These revised sheets will be handled by the Construction Office and will be added to the "As-Built" plans when construction is completed. This procedure is for all revisions made after the Letting or when the revisions cannot be made available to the prospective Bidders prior to Letting. Any additional or revised plan sheets provided after the Highway Letting will be labeled by the Design Group with a cell named "CHANGE" placed under the box on the upper right-corner. The cell states the following: **Construction Change-Sheet provided after Letting.** If no room is available under the box, then any location near the box will be adequate. These sheets will not be added to the Bid plans, but will be substituted in the working plans.

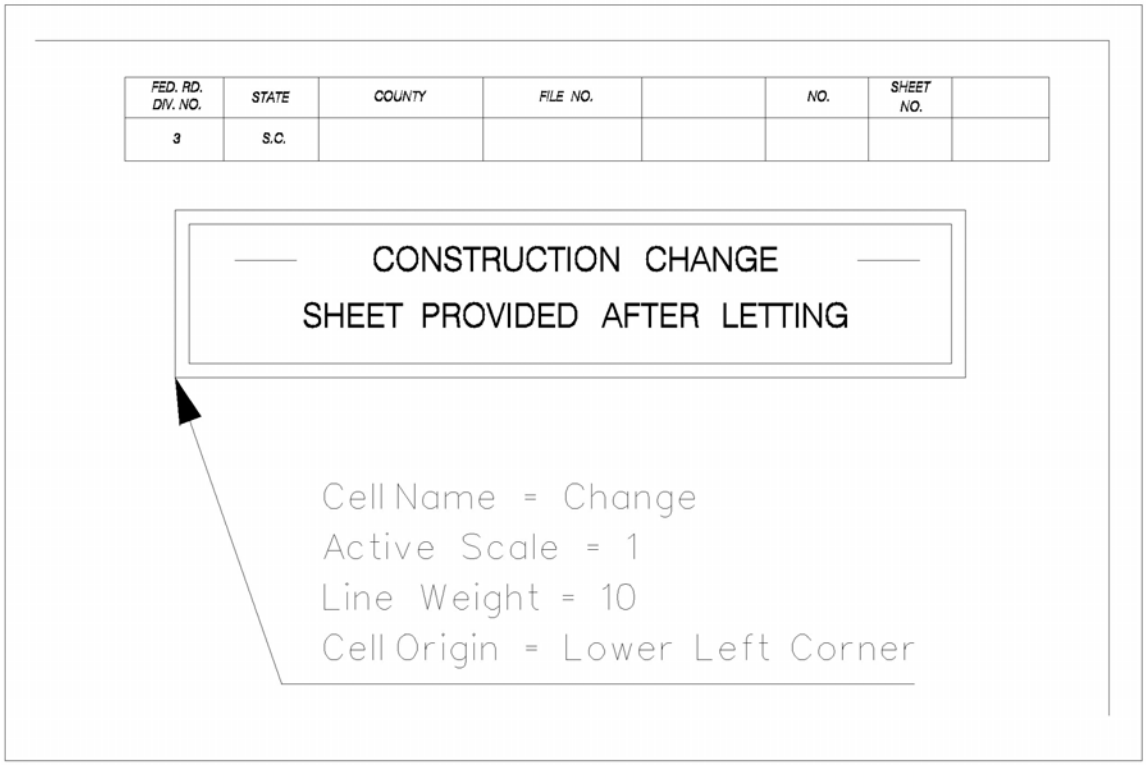
"Working plans" requested by District personnel will include all revised sheets in the proper order with old sheets removed. The Plans Storage Manager will maintain a complete copy of the "working plans" and will provide copies to Department employees when specifically requested. The Engineering Reproduction Manager will mark the "Working Plans" with those words with the date of printing so that the plans are plainly marked so as not to mistake these plans for the Bid plans or Final "as-built" plans.

If the construction change involves changing, adding, or deleting quantities or pay items, a revised "Summary of Estimated Quantities" sheet must be provided along with the changed plan sheet(s). Attached is an example of the note to be placed below the original quantities. The original quantities shall not be changed. The note should include the date of the revision and the sheet numbers of the revised sheets. The changes should be listed in the order shown in the example as applicable. The quantities shown should include a (+) for additional or a (-) for subtracted.

Future revisions should be listed beneath the previous revision. Additional "Summary of Estimated Quantities" sheets may be added if necessary.

SUMMARY OF ESTIMATED QUANTITIES

ITEM NO.	PAY ITEM	QUANTITY	PAY UNIT
1031000	MOBILIZATION	1	LS
1050800	CONST. STAKES, LINES, & GRADES	1	EA
1071000	TRAFFIC CONTROL	1	LS
1090200	AS-BUILT CONSTRUCTION PLANS	1	LS
2012000	CLEAR. & GRUB. WITHIN RDWY.	1	LS
2013050	CLEARING & GRUBBING DITCHES	0.5	ACRE
2031000	UNCLASSIFIED EXCAVATION	4165	CY
2033000	BORROW EXCAVATION	7797	CY
2034000	MUCK EXCAVATION	3717	CY
3050108	GRADED AGGR. BASE COURSE-8” UNIF	10215	SY
3069900	MAINTENANCE STONE	50	TON
3103000	H/M ASPH. AGG. BASE CR.-TYPE 2	2746	TON
4010005	PRIME COAT	2759	GAL
4011004	LIQUID ASPHALT BINDER PG64-22	232	TON
4013990	MILL. EXIST. ASPH. PVMT.-VARIABLE	2320	SY
4023000	H/M ASPH. CON. BINDER CR.-TYPE 2	991	TON
	Revised Pay Items – MM/DD/YY -		
	Affected Sheets 4,6,7		
	Pay Items Revised	**Adjustments to Quantities**	
2034000	MUCK EXCAVATION	-500	CY
3069900	MAINTENANCE STONE	+25	TON
	Pay Items Deleted		
4013990	MILL. EXIST. ASPH. PVMT. –VARIABLE	-2820	SY
	Pay Items Added		
4031100	H/M ASPH. CONC. SURF. CR. TYPE 1	+1013	TON



8. Revisions to Right-of-Way and Construction Plans

Right-of-Way Phase:

Plans are prepared for the SCDOT to acquire right-of-way. The Road Design Operations Center (Operations) receives these right-of-way plans. Copies of these plans are then submitted to the SCDOT Right-of-Way Office (ROW) to begin the acquisition of right-of-way. The original plans are returned to the Design Groups to be updated during the right-of-way acquisition phase and completed for the Construction Phase.

The following table shows the copies and distribution for the initial distribution of Right-of-Way Plans:

PRIMARY PROJECTS WITHIN A CITY OR TOWN
2 large sets with cross sections to SCDOT ROW
5 large sets without cross sections to SCDOT ROW
1 small set with cross sections to SCDOT ROW
4 small sets without cross sections to SCDOT ROW
1 large set with cross sections to SCDOT Utilities Office
1 large set without cross sections to SCDOT District Office
1 large set with cross sections to SCDOT Railroad (if applicable)

PRIMARY PROJECTS NOT WITHIN A CITY OR TOWN
2 large sets with cross sections to SCDOT ROW
4 large sets without cross sections to SCDOT ROW
1 small set with cross sections to SCDOT ROW
4 small sets without cross sections to SCDOT ROW
1 large set with cross sections to SCDOT Utilities Office
1 large set without cross sections to SCDOT District Office
1 large set with cross sections to SCDOT Railroad Coordinator (if applicable)

At this point the acquisition of right-of-way begins. The Road Design Groups continue to complete the plans for construction. In developing the plans for the construction phase, it is the responsibility of the Design Group Coordinator to track all changes or revisions to the plans after the initial submittal which will affect the right-of-way acquisition. For example, while the drainage plans are being reviewed, perhaps an additional outfall location is required. This will initiate a right-of-way revision. It will be necessary to send out copies of the revised sheets so that all current plan holders are aware of the changes, especially those who are acquiring right-of-way or obtaining permissions for the construction. Changes to the plans that will not affect the right-of-way process are not sent out.

These revised sheets, which are prepared in accordance with the SCDOT Road Design Plan Preparation Guide 2000, are then delivered to ROW by Operations. The following table shows the number of copies delivered for distribution:

PRIMARY PROJECTS WITHIN A CITY OR TOWN
9 large and 8 small copies of the revised sheets to SCDOT ROW
PRIMARY PROJECTS NOT WITHIN A CITY OR TOWN
8 large and 7 small copies of the revised sheets to SCDOT ROW

It is important that every revised sheet contain a note in the revision box (or upper right hand corner of sheet if no revision box) which includes the date, initials of the person making the change, and a brief description and location of the change, so that anyone who receives a copy of the revised sheet can easily see what has changed from the original sheet. This process continues until the plans are completed for construction. The completed plans are now called bid plans or final construction plans. The bid plans are received and processed by Operations for a highway letting.

Construction Phase:

After the letting, the bid plans are filed in the SCDOT Road Design Plans Storage office. A copy of the original bid plans is stored electronically by the SCDOT Road Design Engineering Reproduction Services department.

After the award of the project, it may be necessary to make changes or revisions to the bid plans. Once a change is made, the bid plans are now called working plans. Changes to the working plans are made by the responsible Design Group. Revised sheets are provided to Operations by the appropriate Design Group. Operations makes the following copies for the SCDOT Construction Office for distribution:

ALL PROJECTS
6 large and 3 small copies of the revised sheets to SCDOT Construction Office

If the change will effect right-of-way or a property owner, then the revised sheets are also sent to ROW for distribution as follows:

PRIMARY PROJECTS WITHIN A CITY OR TOWN
9 large and 8 small copies of the revised sheets to SCDOT ROW
PRIMARY PROJECTS NOT WITHIN A CITY OR TOWN
8 large and 7 small copies of the revised sheets to SCDOT ROW

It is important that every revised sheet contain a note in the revision box (or upper right hand corner of sheet if no revision box is provided) which includes the date, initials of the person making the change, and a brief description and location of the change, so that anyone who receives a copy of the revised sheet can easily see what has changed from the original sheet. Also, a note stating "CONSTRUCTION CHANGE – SHEET PROVIDED AFTER LETTING" should be placed on each revised sheet in accordance with the SCDOT Road Design Plan Preparation Guide 2004.

The revised sheets are scanned by Engineering Reproduction Services. It is important to maintain an up to date scanned copy of the working plans. Requests for copies of plans are submitted to the Plans Storage office by numerous personnel from within and outside the agency. It is vital that the copies they receive are current and match all other copies of the working plans. As revisions are made, the ERS Manager adds a note to the title sheet of the working plans ("Working Plans as of DD/MM/YY") to record the revisions contained in the working copy.

The original hard copies of the revised sheets are then returned by Operations to the Road Design Groups to be inserted into the hard copy of the working plans which are then returned to Plans Storage.

This process continues until the project is complete. The working plans then become the final set of "as designed" plans. These plans incorporate the original bid plans with all of the revisions made and approved by the designer. This set is filed in the SCDOT Road Design Plans Storage office.

The set that is stored in Plan Storage is not an "as-built" set. The "as-built" plans are completed by SCDOT District personnel or the Contractor and submitted to the Final Plans Section of the SCDOT Director of Construction Office where they are filed and stored. It is important to note that the designer cannot be responsible for all changes or revisions to plans. During the construction of the project, the resident engineer assumes responsibility for changes that arise to meet field conditions. It is the responsibility of the resident engineer to track and record these changes on the "as-built" plans. Changes by the field offices are not sent to Operations for copying, distribution, scanning, etc.

SPEC100A

SURVEY CODES LEGEND

CODE	TYPE	FEATURE DESCRIPTION
AC	S	AIR CONDITIONER UNIT
AGT	L	ABOVE GROUND TANK
B	L	BUILDING
BDL	L	BERM DITCH LEFT
BDR	L	BERM DITCH RIGHT
BM	L	BENCH MARK
BRC	S	BRIDGE-CONCRETE
BRW	S	BRIDGE-WOOD
C	S	COLUMN
CBN	S	CATCHBASIN
CEM	L	CEMETERY LINE
CFL	L	FACE OF CURB LEFT
CFR	L	FACE OF CURB RIGHT
CL	S	CL PROFILE (WILL HAVE X-SECTION
CLP	S	CL PROFILE (NO CROSS X-SECTION
CMT	S	CONCRETE MONUMENT
CP	S	CONTROL POINT
CRL	L	CREEK BANK LEFT
CRR	L	CREEK BANK RIGHT
CVL	L	CULVERT
D	L	EDGE OF DIRT DRIVEWAY
DAM	L	DAM
DE	L	EDGE OF CONCRETE DRIVEWAY
DEF	S	DEFAULT FEATURE CODE
DF	S	UNDERGROUND DRAIN FIELDS
DI	S	DROP INLET
DP	L	EDGE OF PAVED (ASPHALT) DRIVEWAY
DTL	L	DITCH LEFT
DTR	L	DITCH RIGHT
EP1	L	EDGE OF PAVEMENT LINE 1
EP2	L	EDGE OF PAVEMENT LINE 2
EP3	L	EDGE OF PAVEMENT LINE 3
EP4	L	EDGE OF PAVEMENT LINE 4
EPL	L	EDGE OF PAVEMENT LEFT
EPP	S	ELECTRICAL PEDESTAL
EPR	L	EDGE OF PAVEMENT RIGHT
ERR	L	EDGE OF DIRT ROAD RIGHT
EU	S	ELECTRIC UTILITY
FH	S	FIRE HYDRANT
FL	L	FENCE LEFT
FR	L	FENCE RIGHT

CODE	TY	FEATURE DESCRIPTION
GL	L	GAS LINE
GLT	S	GAS LINE TEST POINT
GM	S	GAS METER
GP	S	GUY POLE
GPI	L	GUARD RAIL ISLAND
GRV	L	GRAVE OR CEMETERY
GV	S	GAS VALVE
GW	S	GUY WIRE
H	L	HEDGE ROW
HW	L	HEADWALL
ICL	S	INTERSECTING ROAD CENTERLINE
IP	S	IRON PIN FOUND
JB	S	JUNCTION BOX
LC	L	CLOTHES LINE
LP	S	LIGHT POLE
MAR	L	MARSH LINE
MCL	L	MISC. CURB LEFT OF C/L: A
MCR	L	MISC. CURB RIGHT OF C/L: A
MED	L	MEDIAN-CONCRETE
MHD	S	MAN HOLE-DRAINAGE
MHS	S	MAN HOLE-SANITARY SEWER
MHU	S	MAN HOLE-UTILITY
MSL3	L	MISCELLANEOUS LINE 3
MSL4	L	MISCELLANEOUS LINE 4
MSL1	L	MISCELLANEOUS LINE 1
MSL2	L	MISCELLANEOUS LINE 2
MSP	S	MISCELLANEOUS POINT

CODE	TYPE	FEATURE DESCRIPTION
ODL	L	OUTFALL DRAINAGE LINE
OE	L	OUTFALL EDGE LINE PROFILE
OT	S	ORCHARD TREE (APPLE,PECAN,ETC.)
OTL	L	ORCHARD TREE LINE LEFT
OTR	L	ORCHARD TREE LINE RTGHT
P	S	PIPE
PC	S	POINT OF CURVE
PCC	S	POINT OF COMPOUND CURVE
PI	S	POINT OF INTERSECTION
PK	S	PARKING METER
PL	L	PROPERTY LINE (SHOT ON LINE)
PLC	S	PROPERTY LINE CORNER (COMPUTED

CODE	TY	FEATURE DESCRIPTION
POC	S	POINT ON CURVE
POST	S	POINT ON SUB TANGENT
PT	S	POINT ON TANGENT
PP	S	POWER POLE
PRC	S	POINT OF REVERSE CURVE
PT	S	POINT OF TANGENCY
RP	S	RADIUS POINT OF CURVE
RR	L	RAILROAD TRACK
RRM	S	RAILROAD MILE POST
RRS	S	RAILROAD SIGNAL
RRT	S	RAILROAD TRESTLE
RRX	S	RAILROAD CROSSING ARM
RW	S	RIGHT OF WAY MONUMENTSTING
RWM	S	RIGHT OF WAY MONUMENT
S	S	SHRUB
SAT	S	SATELLITE DISH
SD	L	SIDE ROW OF SHRUBS
SGN	S	SIGN
SGP	S	SIGN POST
SPR	S	SPRING
SS	L	SANITARY SEWER
ST	L	SEPTIC TANK
STP	L	STEPS
SW	L	SIDEWALK TO THE ROAD
SWL	L	SIDEWALK LEFT OF C/L
SWP	L	SWAMP LINE
SWR	L	SIDEWALK RIGHT OF C/L
T	S	TREE
TCW	S	TOWER (RADIO/TV)
TG	S	TELEGRAPH POLE
TL	L	TREE LINE OR WOODS LINE LEFT
TP	S	TELEPHONE POLE
TPP	S	TELEPHONE PEDESTAL
TR	L	TREE LINE OR WOODS LINE RIGHT
TVP	S	CABLE TV PEDESTAL
TW	L	POWER LINE TRANS/MICROWAVE TOWER
UGC	L	UNDERGROUND CABLE
UGT	L	UNDERGROUND TANK
VGL	L	VALLEY GUTTER-LEFT
VGR	L	VALLEY GUTTER-RIGHT
W	L	WALL
WE	L	EDGE OF WATER
WEL	S	WELL

CODE	TY	FEATURE DESCRIPTION
WH	S	HIGH WATER LINE OR MARK
WL	L	WATER LINE
WM	S	WATER METER
WV	S	WATER VALVE
WW	L	WINGWALL
X	S	CROSS SECTION SHOT
XL	S	END OF X-SECTION LEFT
XR	S	END OF X-SECTION RIGHT
XP	S	CROSS SECTION EDGE OF PAVEMENT

REVISIONS		
DATE	REV. BY	DESCRIPTION
8-19-91	MEA	STANDARD ADDED

SCDOT
South Carolina Department of Transportation
STANDARD DRAWING

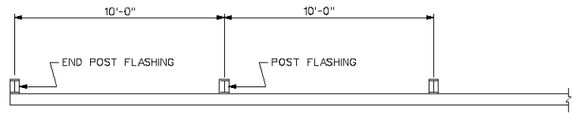
SPECIAL DR.100-A

SURVEY CODES LEGEND

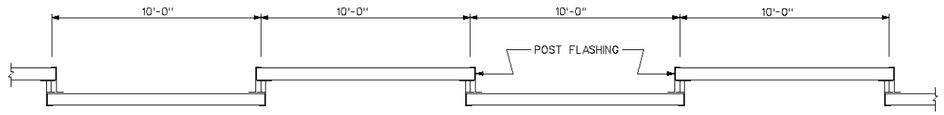
EFFECTIVE LETTING DATE

FIGURE 4-A

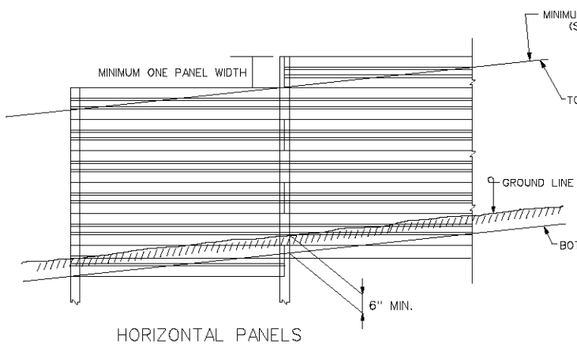
SPEC 709A



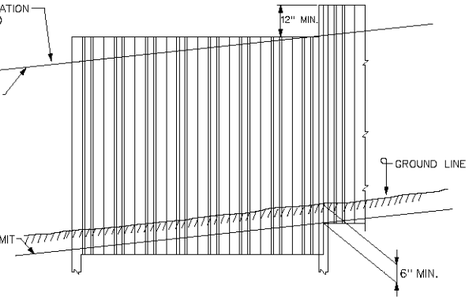
LINEAR PLAN VIEW



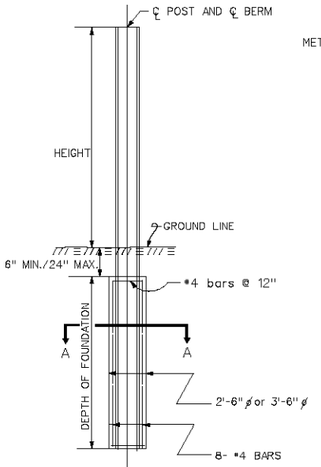
SHADOW BOX PLAN VIEW



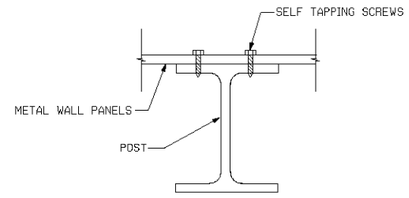
HORIZONTAL PANELS



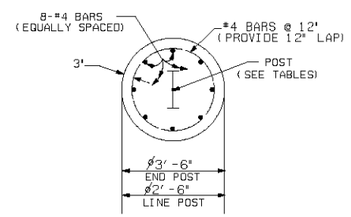
VERTICAL PANELS



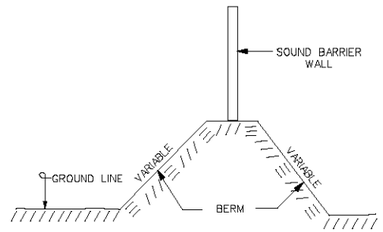
POST DETAIL



PANEL ATTACHMENT DETAIL



SECTION A-A



DETAIL OF BERM
(SEE CROSS SECTIONS AND TYPICAL SECTION)

NOTES:

1. ALL POSTS SHALL BE ENCLOSED WITH FLASHING.
2. THE TOP CAP OF THE WALL SHALL ALSO COVER THE AREA ENCLOSED BY THE POST FLASHING.
3. ADDITIONAL GIRTS, FASTENERS, ETC. SHALL BE SHOWN WHERE NECESSARY IN THE SHOP DRAWINGS, AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR SOUND BARRIER WALL.
4. SEE SPECIAL PROVISIONS FOR ADDITIONAL CONDITIONS.
5. THE PANELS, FLASHING AND ALL EXPOSED SURFACES SHALL HAVE THE COLOR AS SPECIFIED IN THE SPECIAL PROVISIONS.
6. WHERE PANELS BUTT UP AGAINST OTHER PANELS, FLASHING SHALL BE INSTALLED TO ENSURE "AIR TIGHT", NO GAP CONTRUCTION.
7. SHOP DRAWINGS SHALL BE SUBMITTED FOR REVIEW AND APPROVAL BY THE ENGINEER. SEE SECTION 709 OF THE SOUTH CAROLINA HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS. THE SHOP DRAWINGS SHALL BEAR THE SEAL OF A REGISTERED PROFESSIONAL ENGINEER, REGISTERED IN THE STATE OF SOUTH CAROLINA.
8. ALL EQUIPMENT, LABOR, POST, PANELS AND MATERIALS NECESSARY FOR THE CONSTRUCTION OF THE SOUND BARRIER WALL SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE SOUND BARRIER WALL.
9. REINFORCING STEEL CAGE FOR POST BASE SHALL BE SECURELY TIED PRIOR TO PLACING INTO THE GROUND.
10. THE CLASS OF CONCRETE SHALL BE CLASS "A". SEE SECTION 701 OF THE SOUTH CAROLINA HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS.
11. GRADE 60 REINFORCING STEEL CONFORMING TO AASHTO M 31 WILL BE USED ON THIS PROJECT.
12. POSTS SHALL COMPLY WITH THE LATEST AASHTO SPECIFICATIONS FOR M270, GRADE 36 STEEL.
13. SELF-TAPPING SCREWS SHALL BE IN ACCORDANCE WITH THE SPECIAL PROVISIONS.
14. BID ITEM: SOUND BARRIER WALL (STEEL) _____ SQ.FT.

POST AND FOUNDATION TABLE

EXPOSED HEIGHT ABOVED GROUND (FT)	MINIMUM POST SIZE	MINIMUM FOUNDATION DEPTH
6'-0" TO 6'-6"	W8X13	10'-6"
6'-6" TO 7'-0"	W8X13	11'-0"
7'-0" TO 7'-6"	W8X13	11'-6"
7'-6" TO 8'-0"	W8X13	11'-9"
8'-0" TO 8'-6"	W8X15	12'-0"
8'-6" TO 9'-0"	W8X15	12'-6"
9'-0" TO 9'-6"	W8X18	12'-9"
9'-6" TO 10'-0"	W8X18	13'-3"
10'-0" TO 10'-6"	W8X18	13'-6"
10'-6" TO 11'-0"	W8X21	13'-9"
11'-0" TO 11'-6"	W8X21	14'-3"
11'-6" TO 12'-0"	W8X21	14'-6"
12'-0" TO 12'-6"	W8X24	14'-9"
12'-6" TO 13'-0"	W8X24	15'-0"
13'-0" TO 13'-6"	W8X28	15'-6"
13'-6" TO 14'-0"	W8X28	15'-9"
14'-0" TO 14'-6"	W10X30	15'-0"
14'-6" TO 15'-0"	W10X30	16'-3"
15'-0" TO 15'-6"	W10X30	16'-6"
15'-6" TO 16'-0"	W10X30	16'-9"
16'-0" TO 16'-6"	W10X30	17'-3"
16'-6" TO 17'-0"	W12X30	17'-6"
17'-0" TO 17'-6"	W12X30	17'-9"
17'-6" TO 18'-0"	W12X30	18'-0"

DESIGN DATA:

GUIDE SPECIFICATIONS FOR STRUCTURAL DESIGN OF SOUND BARRIERS - 1989

WIND LOAD:
42 PSF (90 MPH)

DESIGN ASSUMPTIONS FOR SOIL:
UNIT WT. - 125 PCF
ø - 32°
C - 0
EMBANKMENT SLOPE - 2:1

UNIT STRESSES FOR POST (SERVICE LOAD DESIGN):
fb= (1.33)X(20.0) = 26.6 KSI

QUANTITIES FOR POST ONLY

END POST
CLASS "A" CONCRETE - 0.356 CY/FT
REINFORCING STEEL - 12.3 LBS/FT

LINE POST
CLASS "A" CONCRETE - 0.182 CY/FT
REINFORCING STEEL - 10.2 LBS/FT

REVISIONS		
DATE	REV. BY	DESCRIPTION
10-91	WRC	REDRAWN

SCDOT
South Carolina Department of Transportation
STANDARD DRAWING

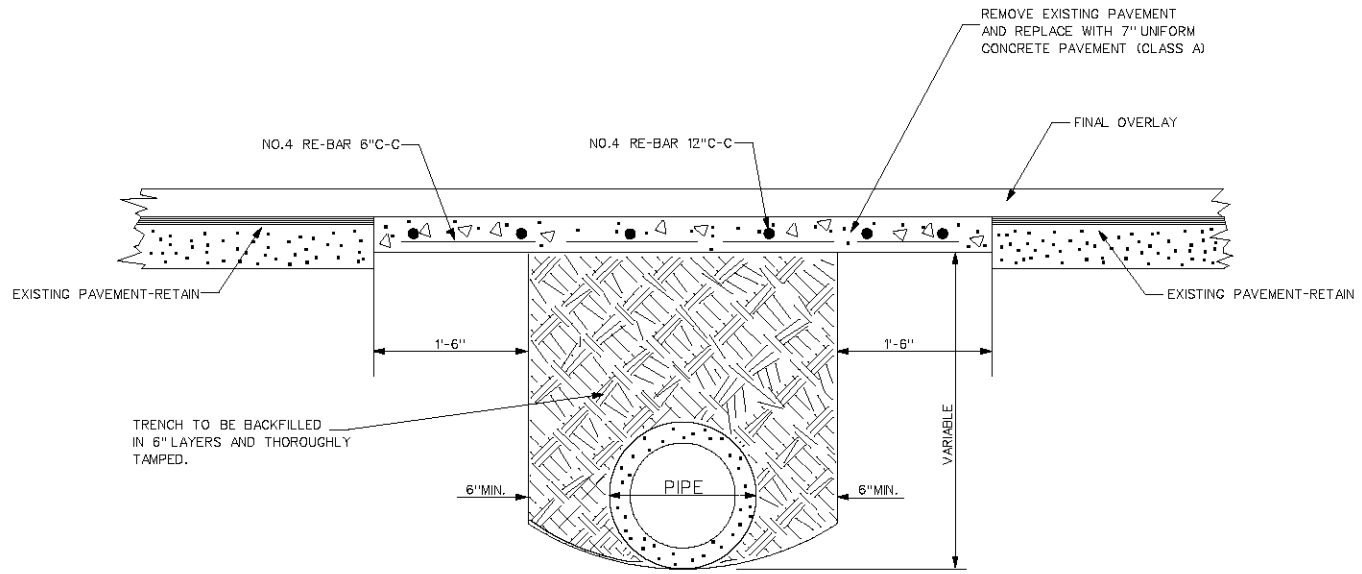
SPECIAL DRAWING 709-A

SOUND BARRIER WALL

EFFECTIVE LETTING DATE

FIGURE 4-B

SPEC714A



NOTE:

1. THE CONCRETE SHALL CONSIST OF A HIGH EARLY STRENGTH ADMIXTURE IN ACCORDANCE WITH SUB-SECTION 701.6 OF THE STANDARD SPECIFICATIONS.

2. THE CONCRETE SHALL BE CURED IN ACCORDANCE WITH SUB-SECTION 702.04 AND 702.20 OF THE STANDARD SPECIFICATIONS.

3. NO TRAFFIC SHALL BE PLACED DIRECTLY ON THE CONCRETE FOR 24 HOURS. WHERE TRAFFIC CANNOT BE DETOURED FOR THIS PERIOD OF TIME, A STRUCTURAL PLATE MATERIAL MAY BE PLACED OVER THE CONCRETE TO CARRY THE TRAFFIC LOAD.

4. WHERE WIDENING IS TO BE PERFORMED ADJACENT TO THE EXISTING PAVEMENT, THE GRADE SHALL BE BROUGHT UP AT LEAST THROUGH THE BASE COURSE BEFORE DETOURING TRAFFIC FOR THE 24 HOUR PERIOD TO PLACE THE CONCRETE SLAB.

5. WHERE THERE IS AN EARTH MEDIAN, THE NEW LANE SHALL BE CONSTRUCTED WITH THE COMPLETE PAVEMENT STRUCTURE PRIOR TO CUTTING THE EXISTING PAVEMENT FOR DRAINAGE WORK. THE NEW LANE SHALL BE USED TO DETOUR TRAFFIC WHILE CONSTRUCTION IS BEING PERFORMED IN THE EXISTING LANE.

6. REINFORCING BARS SHALL BE DEFORMED, GRADE 60, AND SHALL CONFORM TO AASHTO M-31.

7. THE BID ITEM SHALL BE:
CONCRETE FOR STRUCTURES-CLASS A (ROADWAY) __FEET^3.
REINFORCING STEEL FOR STRUCTURES (ROADWAY) __LBS.

REVISIONS		
DATE	REV. BY	DESCRIPTION
1/15/89	J.W.B.	REDRAWN AND NOTE REVISED
6/12/91	S.C.M.	NOTES REVISED

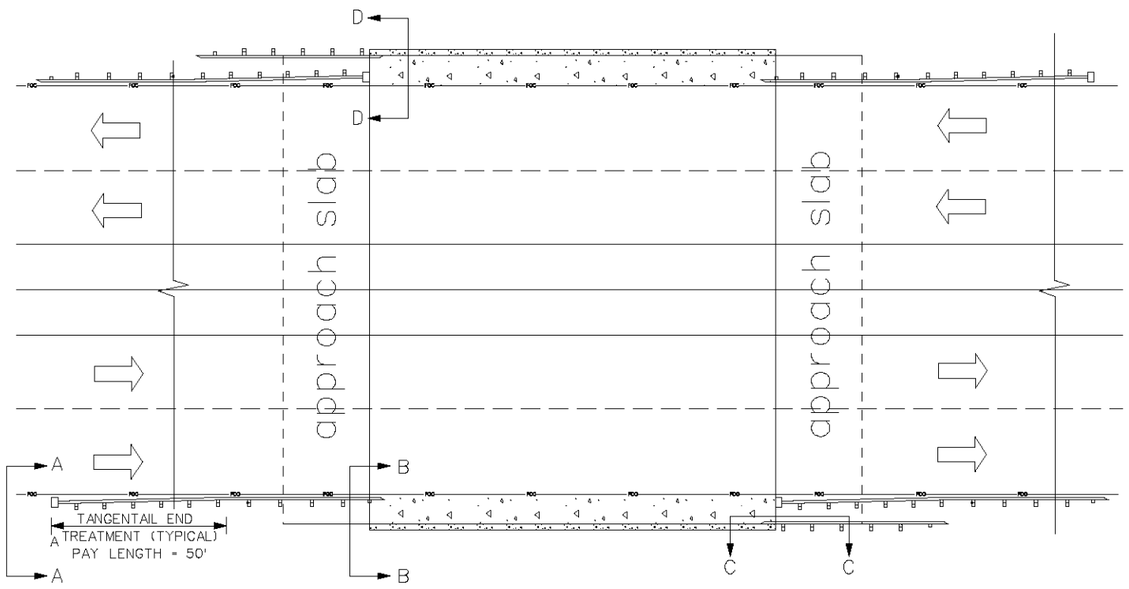
South Carolina Department of Transportation
STANDARD DRAWING

SPECIAL DRAWING NO. 714-A

STANDARD FOR REPLACING PAVEMENT ON BACKFILL OVER PIPE IN EXISTING ROADWAYS

EFFECTIVE LETTING DATE

spec805icr



DETAIL OF GUARDRAIL ON BRIDGE APPROACH

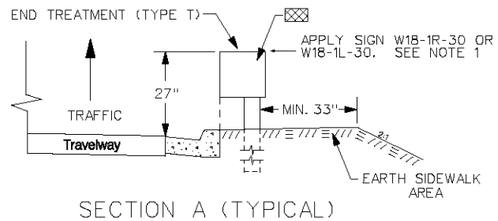
NOTES :

1. SIGN W18-1R-30 OR W18-1L TO BE INSTALLED ON END ANCHOR. THE SIGN SHOULD BE FABRICATED FROM TYPE III SHEETING WITH A HIGH TACK ADHESIVE WITHOUT AN ALUMINUM BLANK. THE METAL SHOULD BE CLEANED THOROUGHLY BEFORE INSTALLATION. THE COST OF SIGN AND INSTALLATION SHALL BE INCLUDED IN THE PRICE BID FOR THE END ANCHOR. LAYOUT FOR THIS SIGN IS AVAILABLE FROM THE DIRECTOR OF TRAFFIC ENGINEERING.

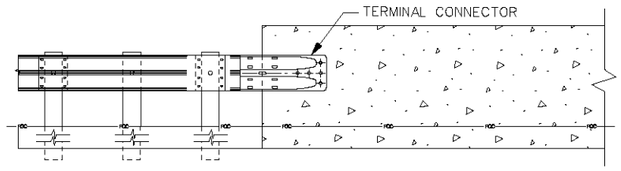
2. IMPACT HEAD OF TANGENTIAL END TREATMENT OFFSET TO FIT BACK OF CURB.

3. THE W-BEAM TERMINAL CONNECTOR WILL BE MEASURED AND PAID FOR AS STEEL BEAM GUARDRAIL.

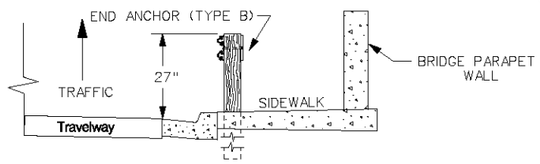
4. SEE APPROPRIATE STANDARDS FOR END ANCHORS AND CONNECTIONS.



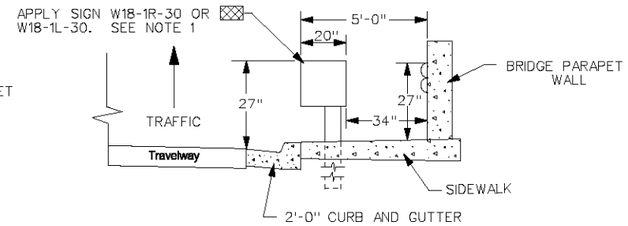
SECTION A (TYPICAL)



W BEAM GUARDRAIL BRIDGE CONNECTION
SECTION C (TYPICAL)



SECTION B (TYPICAL)



SECTION D (TYPICAL)

REVISIONS		
DATE	REV. BY	DESCRIPTION
10-23-98	D.H.A.	DRAWN
11-17-98	C.I.F.S.	REV. SPELLING AND LINE WEIGHT

SCDOT
South Carolina Department of Transportation
STANDARD DRAWING

SPECIAL DRAWING NO. 805-9B

GUARDRAIL APPLICATION AT BRIDGE WITH SIDEWALK

EFFECTIVE LETTING DATE

FIGURE 4-D

FED. ROAD DIV. NO.	STATE	COUNTY	FILE NO.		ROUTE NO.	SHEET NO.	
2	S.C.						

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION

GENERAL CONSTRUCTION NOTE:

The State Highway Engineer must specifically authorize changes involving increased cost of project or changes in alignment. The District Engineering Administrator is permitted under the direction of the State Highway Engineer to authorize minor alterations not in conflict with the standard practices of the Department. Forward information on any proposed changes in alignment to the Columbia Office as soon as possible.

See individual curves on Reference Data Sheet for superelevation rate and design speed, as applicable.

The following quantities are not shown in detail on the plans but are included in the Summary of Estimated Quantities and may be adjusted during construction as directed by the Engineer.

CLEARING AND GRUBBING DITCHES	0.52	ACRE	FOR OUTFALL DITCHES
SAND CLAY BASE COURSE (6" UNIFORM)	2900	S.Y.	FOR DRIVES
MAINTENANCE STONE	500	TON	FOR MAINTENANCE FOR DRIVES
PRIME COAT	783	GAL.	FOR DRIVES
LIQUID ASPHALT BINDER PG64-22	14	TON	FOR DRIVES
HOT LAID ASPHALT CONCRETE SURFACE COURSE	229	TON	FOR DRIVES
PERMANENT CONSTRUCTION SIGNS	78	S.F.	AS SHOWN ON STD.DRAWING 605-1
15 " ALTERNATE PIPE	120	L.F.	FOR ADDITIONAL DRAINAGE
18 " ALTERNATE PIPE	200	L.F.	FOR ADDITIONAL DRAINAGE
24 " ALTERNATE PIPE	100	L.F.	FOR ADDITIONAL DRAINAGE
AGGREGATE UNDERDRAIN	65	C.Y.	FOR ADDITIONAL UNDERDRAIN TRENCH BACKFILL
6" PERFORATED PIPE UNDERDRAIN	500	L.F.	FOR SUBSURFACE DRAINAGE
HAND PLACED RIPRAP	100	TON	FOR DITCH LINING AND EMB. ADJACENT TO PIPE
GEOTEX./EROSION CONT.- (CLASS 2) TYPE A	200	S.Y.	FOR EMB. PROTECTION UNDER RIPRAP
RESET FENCE	4979	L.F.	FOR RESETTING EXISTING FENCE
RESET CHAIN LINK FENCE	457	L.F.	FOR RESETTING CHAINLINK FENCE

EROSION CONTROL ITEMS

PERMANENT VEGETATION	52.12	M.S.Y.	FOR ALL DISTURBED AREAS
TEMPORARY VEGETATION	20.85	M.S.Y.	FOR ALL DISTURBED AREAS
MOWING	72.97	M.S.Y.	FOR ALL DISTURBED AREAS
SILT FENCE	10000	L.F.	FOR EROSION CONTROL

Project Contacts

	Name	Telephone
Program /Project Manager :		
Design Group Coordinator:		

PLAN PREPARATION GUIDE

CHAPTER 5

EXISTING TOPOGRAPHY & PROFILE
PRESENT RIGHT-OF-WAY
PROJECT PREPARATION GUIDELINES AND CRITERIA

1. Existing Topography, Profile & Cross Sections

CADD survey data files come from the survey crews via the Survey Office and finally to the Road Design Group. The files are sent to the Headquarters Office on 3.5" floppy diskettes and are loaded into the CADD System by the Survey Office. The diskettes are then given to the Design Groups with any hand survey field notes. The file naming convention of these files follows guidelines set up by the Survey Office. For secondary projects, the county number is used followed by the "C", then the last 4 digits of the pin number. For primary projects a similar format is used, but the "C" is omitted and the pin number replaces the item number.

Started in **February 1994** the secondary projects file names also began using the pin number, similar as to that used by primary projects, except with a "C" followed by the last 4 digits of the pin number. See example (c) below.

EXAMPLE (A) PIN # 201090 = SURVEY FILE 31c1090.new
EXAMPLE (B) PIN # 7189 = SURVEY FILE 327189.new
EXAMPLE (C) PIN # 14726 = SURVEY FILE 18c4726.new

There are several files that will come in from the survey crew, but we will discuss 3 main files that are loaded by the survey office.

.NEW File. The survey file with a '.new' file extension is the main survey data file. This survey file will include a description of the project, the total length of survey, and an index of point numbers used by the survey crew. It also contains N, E, and Z coordinates of all topography features and cross-section shots. Features are classified as either single shot or lines. Single is defined as a feature whose position can be defined by a single measurement or total station shot. For example, a tree would be in the classification. Lines are defined as a feature shown by a series of connected points. For this type of feature the description, or code, of the first point should end with the letter "a" and the last point to designate the end of the line for the feature should end with the letter "b". If the end of the feature cannot be located, such as an underground pipe, the letter "z" is placed immediately before the "b" to note that the feature continues in the general direction of the shot given. In addition to single or line shots there may be abbreviated descriptions following the code such as the code for tree, "T", followed by 10in oak or the code for Building "BA" followed by HT designating it as a house trailer. It will be the responsibility of the Design Groups to insure that the code descriptions are reflected in any labeling of the topography plans. Cross-section shots are usually included in this file and are coded as CL, XP, X, XR, & XL's. Cross-section shots will be true Northing, Easting and Elevation (N,E,Z) in relation to the surveyed coordinates of the project and can be reformatted later for processing in GEOPAK.

For additional information on electronic survey collection methods and survey codes, refer to the Electronic Survey Data Collection Feature Codes and Procedures 1-11-1990 and any supplement.

.SOE File. The survey file with a .SOE extension is a station, offset and elevation cross-section file. If the .NEW file fails to contain the cross-section shots, then they will be sent as a .SOE file. This file usually contains a brief description of the file and an index for the cross-section points. Cross-sections files of this type were stored from hand level readings with centerline station, centerline offset (+ if right of centerline and – if left of centerline) and the elevation. This file can be converted to the (N,E,Z) format later for use of the CADD System.

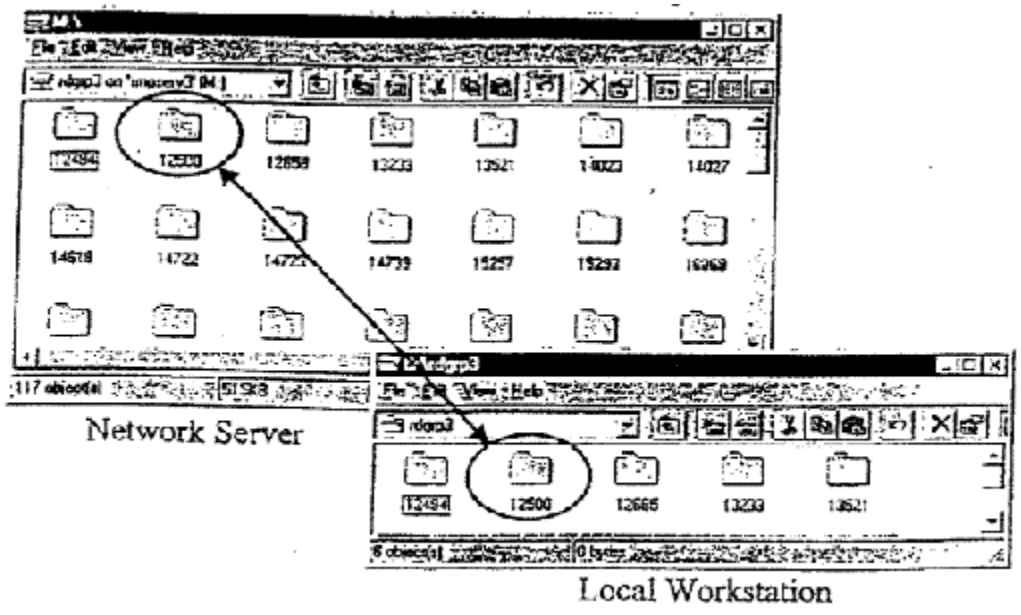
.ALG File. The survey file with the .ALG extension is a file that contains the horizontal alignments beginning station, description and the points that make up the tangent and curve elements of the alignment. This file is generated from the PC versions of SAS that the survey crews use in their field offices. If this file is supplied by surveys, then it will eliminate the Design Group from creating this file in the SAS program. If the file is not supplied by the survey office, then the operators will have to use the SAS program to create this file themselves.

Hand Notes. Besides these survey data files the survey crew will send in additional hand field notes. These may include tax maps, property information, right-of-way, horizontal alignment information, curve data, bearings, reference points, benchmarks, drainage recommendations, utility information and any additional alignment and topo not surveyed electronically. It is the responsibility of the Design Groups to make sure that any pertinent information that is manually taken by the survey crew be shown on the final CADD plans. For examples of existing topo and profiles see figures 5-A and 5-B.

2. Project Data File Storage

All projects are stored on the server (smpserv3). Each Design Group has 14 GB disk space to store every design project in the group. The Road Design CADD Support unit is responsible for creating a project folder (directory) on the server using the pin number and copying all survey data files in. The Design Group will receive a printout of the .NEW file with its smpserv3 directory listed for the Design Group record.

After the Design Group receives notification from the CADD Coordinator of the project folder, they can then begin work on the project. They should first copy the project folder from smpserv3 to their workstation. This folder on the workstation will correspond to the project folder on the smpserv3 with the identical name (PIN number). The tasks to copy and create this folder can be done by using generic Windows NT commands. See figure below.



3. Files Backup

It is the Design Group's responsibility to backup their work to the smpserv3 everyday. Only those files that are changed need to be backed up to the server. Every Design Group user has a login ID assigned to access smpserv3. Passwords for the user ID should not be shared with other users outside of the Design Group.

4. Preparing Project for Field Review

After the operator has created the folders and received the files to their workstation, they are now ready to begin working on the road project. The design files that you will receive were created in the Surveys office and have been checked for accuracy. The Design Group should review the design file in graphics to insure that it meets standard road design norms. The design file could be named for example, r12345.pp.dgn where the "r" stands for Road Design, the "12345" will be the pin number for the project, and "pp" is a description of the design file, such as plan and property. After checking that the design file is correct, then the operator should proceed with breaking the file down into sheets. They should now create a second file named r12345pf.dgn for example, where "pf" would stand for plot file. Using microstation reference files attachments, the user will attach the border sheets and the design file r12345pp.dgn to this new design file, and clip it into the station ranges that the user wants to display on each sheet.

If a property design file was created by the survey office, then it should be merged into the "pp" file so that property lines will be displayed. Also, R/W should be placed into the file and verified. Before merging files together, the user should check to make sure duplication of information would not occur. Example – A second baseline being copied on top of another baseline. Only property information that the user wants to be a part of the "pp" file should be merged.

After the file has been broken down into sheets, the operator is ready to begin texting the plans. The 1st step would be to run the SAS (Survey Automation System) program. An alignment file "05c12345.alg", for example, is usually supplied by the survey office. If it is not supplied, then the operator will have to create it using the SAS program. The program will lead you in the steps for creating the ".alg" file. If the user has any problems with SAS, then they should refer to the SAS documentation. The SAS program will create an ".aln" file, which is necessary for running the next step, SOA.

This step will involve creating the text for describing the various topographic features on the plans. This is done by running the SOA (Station Offset Alignment) program. The program will lead the user through the various menus in generating station and offset text for the various alignments defined earlier in the SAS program. As before, when encountering any problems in SOA, they should refer to the SOA documentation. After creating a text file "05c1234so.dgn", for example, the user should merge the file into the "pf" file and drag it to the appropriate place on the border sheets that correspond to the text for the alignment generated.

The next step for the user is to create the existing profiles and cross-sections using GEOPAK. The survey office should have supplied a "j" statement file in the following format "j123o32.inp" where the "j" stands for the job and "123" would be the last 3 digits of your pin number, "o" stands for operator and "32" stands for the county number. This file should be read into GEOPAK for creation of a database file that will store all horizontal and vertical alignments, cross-section points and property information. This file "job123.gpk" will be created after reading the "j" file. It is very important and should never be deleted unless it has been backed up. The user should now use GEOPAK to create existing profiles and place them on their appropriate border sheets in the "pf" file created earlier.

Next the user will create a design file "r12345dx.dgn, for example, where "dx" stands for design cross-sections. GEOPAK will be used to create and draw these existing cross-sections into this "dx" design file. After this is completed and the user has reviewed the cross-section for accuracy, they should now create another file named r12345fx.dgn, for example, where the "fx" stands for final cross-sections. This file will be where the cross-sections are placed on grid sheets for plotting. Again, the user will run GEOPAK to accomplish this task. The operator should have a good knowledge of GEOPAK before attempting these steps and refer to the user manual for assistance.

If the preliminary design sections have supplied a design for your project, the levels that design is on should be merged into the "pp" file. A Standard Field Review data sheet shall be used as a cover sheet for all projects. In the past, this was called a PS&E Field Review. It is now called a Design Field Review. The data sheet is stored in the g:\rd_std directory as 'dfrts3.dgn'. (See Figure 5-B). After this is done, the Design Group can print the Field Review sheets by using the IPLOT from the CADD system. Changes are often made to the Design Field Review Title Sheet. Please refer to this Guide and the Instructional Bulletins to find the most current sheet.

For **secondary projects**, the Design Group will print two full sized copies and one half sized copy of plan sheets. The Design Group should mark with a green pencil the pipe recommendations, new R/W, beginning and ending notes, and a proposed grade. Field reviews cover sheet with location map. All sets of the field review prints should be forwarded to the Program Development Manager's office for distribution.

For **primary projects**, the Design Group will print a minimum of six half sized copies of plan sheets and 2 half size copies of cross section. The Design Group will mark beginning and ending notes, and any other questionable items on the copy that is to be retained by Road Design. Design Group will be responsible to set up field review and distribute copies as necessary.

5. Design Field Review Plans to Project Web

The Design Field Review (DFR) plans produced by Road Design will be made available to users of the Department's intranet through Project Web. Access to the plans will be from Project Viewer only. Updates to the DFR plans will not be made. The DFR plans represent that phase of project development when the plans are reviewed in the field to verify that its design meets the project scope. After the DFR, the plans are to be scanned again showing all recommendations. Both, the "before" and "after" DFR plans will be published on project viewer.

As plans are made for the Project Development Team to meet and review to the project design in the field, the final DFR plans are taken by the Design Group to Engineering Reproduction Services (ERS) for printing. The Design Group Coordinator will ensure the ERS is advised that the plans are to be scanned and are the DFR plans to be published through Project Web. The Design Group Coordinators or their representatives will be responsible for informing the ERS staff which DFR plans they are. Both the "before" and "after" DFR plans will be taken to the ERS for scanning and printing. The Engineering Reproduction Job Ticket should be filled out as shown in the example below. After placing "DFR", put in parentheses the letter "B" for Before and "A" for After. Add the PIN next to the File Number.

If changes are necessary to the "before" DFR plans, the Design Group should provide only the changed or additional sheets to ERS with instructions on how to modify the original set of DFR plans. "After" DFR plans will be scanned only once with no future changes.

Engineering Reproduction Services will scan the "before" and "after" DFR plans to file during the printing process. Both "before" and "after" plans will be scanned as a CALS file (black and white). ERS will advise CADD Support when the DFR plans are available for linking to Project Web through Project Viewer. A unique icon for each, the "before" and "after" DFR plans, will be located on the task bar on Project Viewer in order to access the DFR plans.

If more than one DFR is held, then only the latest DFR plans will be published. ERS will overwrite the previously scanned DFR plans with each subsequent set of DFR plans.

Those projects that are currently beyond the DFR stage will not have their DFR plans scanned and placed on Project Web. The names of all individuals that are invited to attend the DFR will be placed on the DFR plans Title Sheet in the appropriate location by the Design Group prior to the DFR and prior to having the plans scanned for printing and publishing. Since the "after" DFR plans will be scanned in black and white, the Design Group or whoever records the changes on the official DFR plans are requested to boldly circle the changes to bring attention to those areas of the DFR plans. The DFR Title Sheet will not need to use circles to highlight the information placed on the sheet during the DFR.

6. Present Right-of-Way

Present Right-of-Way will be documented by the SCDOT Right-of-Way Department and shown on the plans. This will take place as plans are plotted from the survey data. The Road Design Group is responsible for this action.

In cases where enclosed property is offset from verified present right-of-way, we claim only to the present right-of-way line and not to the property line.

In cases where no present right-of-way exist and property is shown using property pins (monuments) we then claim to the existing property line. This is labeled as new right-of-way. See Figure 5-C on sheet 5-10. In all cases, tax map information must be shown.

7. Electronic Files for "As-Built" Plans

Electronic files to be sent to contractors or District field offices in order to produce as-built plans will be raster files created by scanning the plan sheets into a file. The raster images will be CALS or TIFF files for use by the contractor or District personnel. Vector design files are not to be provided for Final (As-Built) Plan preparation.

8. Hydrology Data

Hydrology data is required to be placed on the profile sheet in the plans for certain drainage facilities on all projects using federal funds. This hydrology data is to be shown in detail for all box culverts, bridges, and pipe culverts 48" or larger.

The Hydraulic Engineering section is providing data sheets to Road Design and Bridge Design. The data below the heading "HYDROLOGY DATA" should be placed in the profile area of the plan sheet. Please see figure 5-A for an example. To ensure that the correct information is placed for these drainage structures, cells have been created named "HDATBR", "HDATPC", "HDATBC" for the hydrology data required for bridges, pipe and box culverts, and large box culverts, respectively. The cells can be found in the cell library. It should be placed on the plans in the profile area as follows:

1. Place cell
2. Drop cell status
3. Edit text using hydrology data supplied by Hydraulic Engineering
4. Modify rectangle to ensure that text fits rectangle, if needed

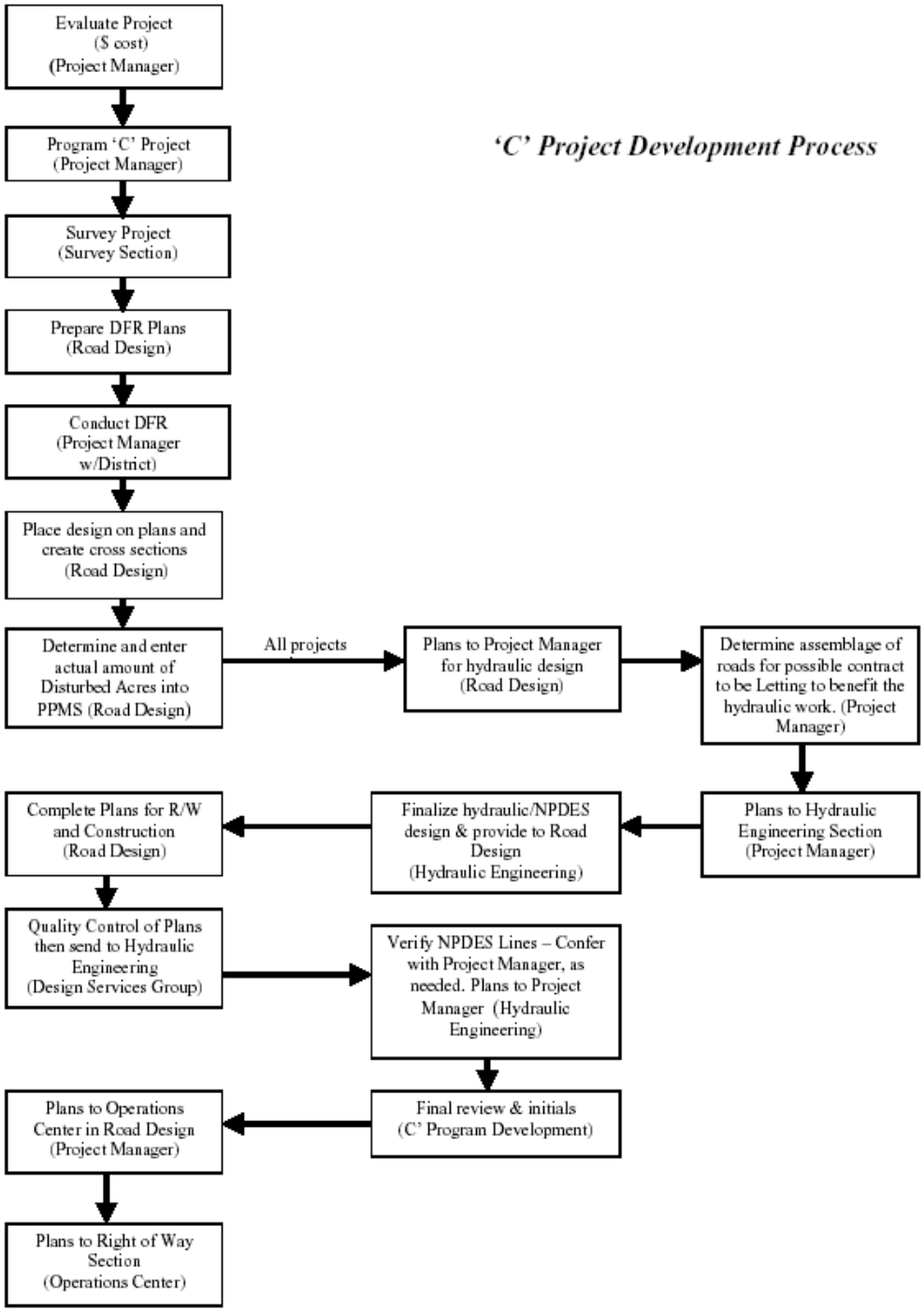
9. Road Design Production Criteria for "C" Projects

Secondary road projects managed by 'C' Project Development follow the process shown on the flow chart below. The following is Road Design's plan production criteria for 'C' projects:

1. Design Field Review (DFR) prints completed within 28 calendar days after receiving survey.
2. Road Design has a total of 56 calendar days to complete the Final Construction Plans after the return of the DFR prints. When plans are sent to the Project Manager for hydraulic design, the time allotted to Road Design stops. When the Hydraulic Engineer provides the hydraulic design to the design group, Road Design's time starts back up.
3. Projects with 1.0 acre or more of disturbed area will need hydraulic and/or NPDES design. The Road Design Group will send all plans (even those under 0.5 acre disturbed) with design and cross-sections to the Project Manager who will determine the impact of grouping roadway projects to be let together. After determining all roads affected in a possible contract, the Project Manager forwards the plans to the Hydraulic Engineering Section with the grouping information for hydraulic and/or NPDES design. The Hydraulic Engineering Section will provide the design information to the Road Design Group for inclusion into the plans.

4. After Final Construction Plans are completed, quality control performed in the Design Group and performed by the Design Services Group are to be completed within 14 calendar days.

Delays caused by others such as hydrology studies, utilities, traffic engineering design reviews, and additional surveys may change the above anticipated schedule. However, every effort should be made to deliver plans within these guidelines or within an adjusted schedule due to extenuating circumstances and approved by the Project Manager. Our goal, in any case, is to prepare 'C' project plans as expeditiously as practical.



PIN NO. 23509
ITEM NO. 096817

RDS003
Hv/23509/r23509pf.dgn

FED. ROAD DIV. NO.	STATE	COUNTY	FILE NO.		ROAD NO.	SHEET NO.
3	S.C.	SPARTANBURG	42522A		S-101	6

W. OCONEE ST.

UTILITY NOTES:

POWER: DUKE POWER COMPANY
TELEPHONE: CHESNEE TELEPHONE
GAS: PIEDMONT NATURAL GAS
WATER LINES: LIBERTY-CHESNEE FINGERVILLE DISTRICT
SEWER: SEPTIC TANKS
CABLE: CHESNEEE COMMUNICATION

ERECT QUADGUARD (3 BAY- 24" WIDE) WITH CONCRETE BACKUP
CONST. C.B. TYPE-9
PLACE 64' - 18" R.C. PIPE

CONSTRUCT SHOULDER PAVING, BRIDGE END CONCRETE CURB(9" X 15") AND FLUME AND PLACE 10 TONS OF RIPRAP

ERECT QUADGUARD (3 BAY- 24" WIDE) WITH CONCRETE BACKUP

CONSTRUCT DRIVE APPROX. AS SHOWN EST. EXC. = 50 CY. WHERE DIRECTED BY THE ENGINEER OBT. PERMISSION

(5) CLINCHFIELD R/R

(3) HEYWARD McKINNEY
TAX MAP 2-14-00
DEED BK. 68R/523
PLAT BK. 107/755/141/109
OBTAIN 311 S.F.

REMOVE 32' - 18" R.C. PIPE
PLACE 52' - 18" R.C. PIPE
PLACE 36' - 18" R.C. PIPE

GEORGE R. & MARY B. HUMPRIES

LOUISE THOMAS

BETTY G. & CHARLES R. THOMAS 30

RES.

RETAIN PRES. 33' R/W

RD. S-101 (W. OCONEE ST.)

S 81° 30' 00" E

RETAIN PRES. 33' R/W (FILE 42.32/A.1950) LVG

OBTAIN NEW 25' X 25' PL

OBTAIN NEW 15' X 15' PL

TIE EQUALITY
P.O.T. STA. 31+41.43 RD. S-101 (W. OCONEE ST.)
P.I. STA. 10+00.00 (OHIO ST. RELOCATION)

OHIO ST.

REMOVE AND DISPOSE OF EXISTING BITUMINOUS SURFACING AND STONE BASE AS SHOWN BY SHADED AREA SHAPE & GRADE AREA TO DRAIN

(1) JIMLYN COVINGTON
TAX MAP 2-14-01 DEED BK. 65D/755
OBTAIN 112 S.F.

SURVEY STA. 30+00.00 BEGIN
FILE 45.522A RD.S-101

ERECT THRIE BEAM G.R. BRIDGE CONN. WITH SHOP BEND 30' RADIUS
ERECT 12.5' STEEL BEAM GUARDRAIL
CONSTRUCT END TERMINAL - TYPE T

CONSTRUCT SHOULDER PAVING, BRIDGE END CONCRETE CURB(9" X 15") AS SHOWN AND FLUME AND PLACE 20 TONS OF RIPRAP

ERECT QUADGUARD (3 BAY- 24" WIDE) WITH CONCRETE BACKUP

CLEAN OUTFALL DITCH
APPROX. 50 L.F.
EST. EXC. = 10 C.Y.
OBT. PERMISSION

TIE EQUALITY OBTAIN 311 S.F.
P.O.T. STA. 32+55.01 S-101 (W. OCONEE ST.) =
P.O.T. STA. 2+00.00 CLINCHFIELD R/R

(2) HEYWARD McKINNEY
TAX MAP 2-14-00 DEED BK. 68R/523
PLAT BK. 107/755/141/108

PLACE 2 TONS HAND PLACED RIPRAP D50 = 0.5
PLACE 4 S.Y. OF GEOTEX / EROS. CONT. (CLASS 2) TYPE C AS DIRECTED BY ENGINEER (OBTAIN PERMISSION)

PLACE 36' - 18" R.C. PIPE
OBTAIN PERMISSION
CONSTRUCT DRIVE APPROX. AS SHOWN EST. EXC. = 50 C.Y. WHERE DIRECTED BY THE ENGINEER OBT. PERMISSION

RETAIN 12" R.C. PIPE

RETAIN 15" R.C. PIPE

W.C. McKINNEY ESTATE

PRES. 33' R/W

SURVEY STA. 34+50.00 END
FILE 45.522A RD.S-101

ALIGNMENT CONTROL CAN BE FOUND ON REFERENCE SHEET

HYDROLOGY DATA:
D.A. = 5.413 sq. mi. = 3464.32 ac.
Q50 = 1188.14 cfs.
Vel. = 3.99 FT/sec.
50 Year H.W. Elev. = 23 ft.
Q100 = 1373.61 cfs.
Vel. = 4.29 FT/sec.
100 Year H.W. Elev. = 23 ft.
NOTE : Data from Bridge Section
OVERTOPPING FLOOD:
Q= 3900 cfs.
Probability = less than 0.2%

EXC. = 200 C.Y. EMB. = 0 C.Y. 30% = 0 C.Y. WASTE = 200 C.Y. TOTAL = 200 C.Y.

EXC. = 91 C.Y. EMB. = 26 C.Y. 30% = 8 C.Y. WASTE = 57 C.Y. TOTAL = 91 C.Y.

87' V.C.

106' V.C.

(-) 0.74%

(+) 0.40%

(+) 1.15%

FINISHED GRADE
VPI = 31+48
Elev. = 923.83
1ST. TOE OF FILL 52.02

VPI = 33+72
Elev. = 924.72
2 ND TOE OF FILL 33.08

1ST RAIL EL. = 928.05

2 ND RAIL EL. = 928.12

924.12 (+00) 924.15 VPC
924.55 (+04) 924.00 VPT BEG. CURV.
924.18 (+08) 923.95
924.24 (+12) 924.04
924.24 (+16) 924.14
924.44 (+18) 924.51 VPC END BR.
924.82 (+25) 925.34 VPT
925.07 (+35) 925.83

30+00.00 32+02.00 33+08.00 34+50.00

28+00 29+00 30+00 31+00 32+00 33+00 34+00 35+00 36+00 37+00 38+00

930 920 910 900 890 880 870

proline3.dgn

FIGURE 5-A

dfrts3.dgn

SCDOT
South Carolina Department of Transportation

DESIGN FIELD REVIEW

_____ COUNTY
RTE./RD._____
FILE _____ PROJ._____
FROM:_____TO:_____

SEEDING:

SEEDING: MULCHED / UNMULCHED
TEMPORARY SEEDING (% OF PERMANENT SEEDING) _____ %
SODDING: Y / N _____SY
PERMANENT VEGETATION _____
TEMPORARY VEGETATION _____ %

INCIDENTAL ITEMS:

FLOWABLE FILL _____C. Y.
REM. & DISPOSAL OF EXISTING PAV'T (CONC. DR., WALKS) _____S. Y.
CONCRETE DRIVEWAYS (6" UNIFORM) _____S. Y.
CONCRETE DRIVEWAYS (8" UNIFORM) _____S. Y.
CONCRETE FOR STRUCTURES-CLASS A _____C. Y.
REINFORCING STEEL _____LBS.
CONCRETE FOR STRUCTURES-CLASS B _____C. Y.
BRICK MASONRY (NONREINFORCED / REINFORCED) _____C. Y.
PAVEMENT MARKINGS : PAINT _____ THERMO _____
RAISED MARKERS _____

CONSTRUCTION STAKES, LINES AND GRADES BY DISTRICT BY CONTRACTOR (CIRCLE ONE)

QUALITY CONTROL BY CONTRACTOR
FOR EARTHWORK Y / N
FOR BASES AND SUBBASES Y / N

BRIDGE REPLACEMENT:

SKETCH ON THE PLANS THE LOCATION OF THE BRIDGE CONSTRUCTION ACCESS LINES (GIVE DIMENSIONS WHERE NEEDED)
ADDITIONAL GEOTECHNICAL WORK REQUIRED: Y / N
PAVING UNDER GUARDRAIL BY SY BY TON (CIRCLE ONE)

NOTES:

REQUESTED TO ATTEND	ORG.	PHONE	VERIFICATION OF ATTENDANCE (INITIALS)

DATE:_____

MAP OF AREA TO BE PLACED HERE

TRAFFIC DATA
_____ ADT _____
_____ ADT _____
TRUCKS _____ %

WITHIN CITY / TOWN LIMITS ?
YES / NO

RAILROAD INVOLVEMENT ?
YES / NO

FIELD REVIEW PLANS READY: __/__/__
DESIGN GROUP ____ DESIGN GROUP COORDINATOR _____
CHARGE CODE __ ___ ____ ___ ____ ___
PIN NUMBER _____
DIRECTORY NUMBER SMPSAN3/RDGRP /_____
PC NODE NAME rd_4__PC__
FILE NAME _____.DGN
SURVEY LENGTH _____ MI.

TRAFFIC CONTROL: Y / N

CLEARING AND GRUBBING:

WITHIN ROADWAY _____ (NO EXPLANATION NECESSARY)
WITHIN RIGHT OF WAY _____ (IF NO REASON IS GIVEN , THEN C&G MAY BE CHANGED TO "WITHIN ROADWAY")
REASON: _____

RIGHT OF WAY RECOMMENDATIONS:

NEW R/W WIDTH:_____TOTAL SEE PLANS: Y / N
SLOPES OBTAIN PERMISSION: Y / N
SLOPES COVER WITH RIGHT OF WAY: Y / N
CONTROL OF ACCESS Y / N
COMMENTS:_____

DESIGN CRITERIA:

TYPICAL SECTION_____THRUOUT
_____ STA._____TO STA._____
_____ STA._____TO STA._____
SURFACING: WIDTH____MATERIAL____TYPE____RATE
WIDTH____MATERIAL____TYPE____RATE
BASE: WIDTH____MATERIAL____TYPE____RATE/THICKNESS_____
PAVEMENT DESIGN DETERMINED ON DFR BY:_____
MAINTENANCE STONE _____TONS
OBT R/W: Y / N
DESIGN SPEED:_____ MPH GROUP ____ RURAL/URBAN/SUBDIVISION
INTERSECTION "THROAT" WIDTH____FT RADII___FT
CLEARING & GRUBBING DITCHES: _____ACRES
CONSTRUCTION SIGNS: _____S. F.
SHRINKAGE FACTOR_____ % BORROW EXCAVATION: Y / N
MUCKING: STA._____TO STA._____;WIDTH___;DEPTH___; ____C.Y.
MILLING:_____" DEPTH STA._____TO STA._____ _____ S. Y.
FULL DEPTH ASPH. PAV. PATCHING_____" UNIF. _____ S. Y.
DITCH PAVING @ 300 LBS./S. Y. _____ TONS

DRAINAGE:

ADDITIONAL _____" PIPE CULVERT _____L. F.
ADDITIONAL _____" PIPE CULVERT _____L. F.

DRAINAGE PIPE MATERIAL:REINFORCED CONCRETE _____
CORR. ALUM. ALLOY _____
H.D. POLYETHYLENE _____
CHECK MORE THAN ONE TO BE BID AS ALTERNATE

ADDITIONAL CATCH BASINS (EA.):
TYPE 9/MH _____ MANHOLE _____24" x 36" D.I._____
TYPE 14_____TYPE 16_____TYPE 17_____TYPE 18_____
_____" PERF. PIPE UNDERDRAIN_____L. F.
_____" PERF. PIPE UNDERDRAIN_____L. F.
AGGREGATE UNDERDRAIN FOR SHOULDERS Y / N
HAND PLACED RIPRAP _____TONS
GEOTEXTILE FABRIC (PROTECTED / UNPROTECTED) _____ S. Y.
EROSION CONTROL BLANKET _____S. Y.
SILT BASINS____C.Y. ;SILT FENCE____L. F.
SEDIMENT TUBES 12"___L. F. ;20"____L. F.
R. C. SLAB FOR CROSSLINE UNDER EXIST. PAV'T Y / N
WILL THE ROAD, ON WHICH THE PIPE TRENCH IS LOCATED, BE RESURFACED IN THE AREA OF THE TRENCH DURING THIS CONSTRUCTION ? Y / N

FOR SECONDARY "C" ROADS
GROUP 1 2 3 4
(CIRCLE ONE)

dfrts3.dgn

FIGURE 5-B

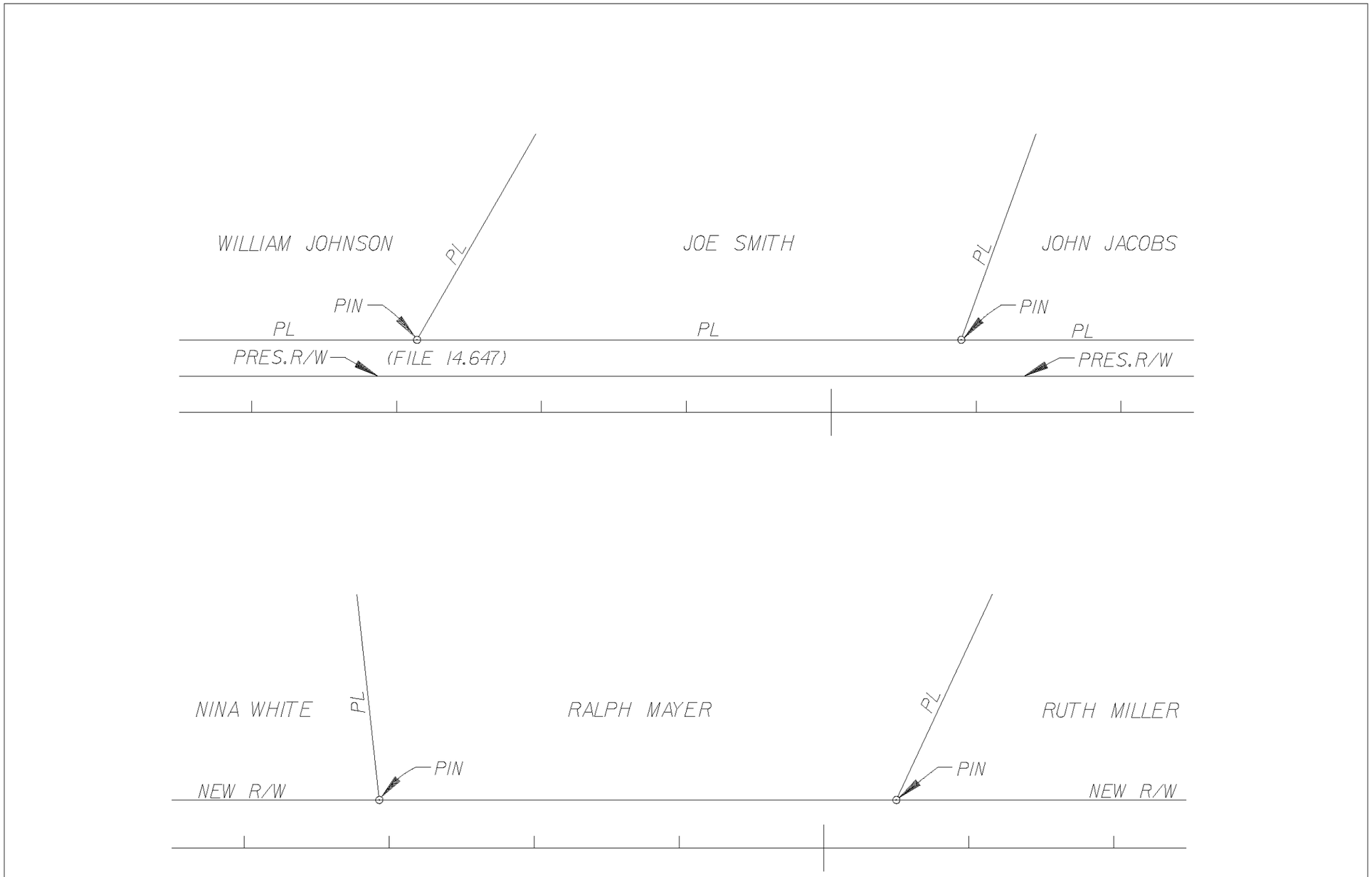

WILLIAM JOHNSON
PL
PIN
PL
PRES. R/W
(FILE 14.647)
JOE SMITH
PL
JOHN JACOBS
PL
PIN
PL
PRES. R/W
NINA WHITE
PL
PIN
NEW R/W
RALPH MAYER
PL
PIN
RUTH MILLER
NEW R/W

FIGURE 5-C

Plan Preparation Guide

Chapter 6

Horizontal Alignment (Center Line)

1. Horizontal Curves (Circular)

The changes in direction along a highway are basically accounted for by curves consisting of portions of a circle. Its principal characteristic is measured by the RADIUS or by a related quality referred to as the DEGREE of curve.

When it is necessary to relocate the roadway centerline of a project, new points for the relocated PC, PI, PT, and POT's should be determined and shown on the plan's Reference Sheet. These new points should be identified as relocated points. Each point will be identified by xyz coordinates on the Reference Sheet and shown on the plan sheet as "Relocated PC", etc. with stationing. This procedure is in lieu of providing station-offsets for the relocated points. Use the new coordinate description on all future work. A note should be placed on the plan sheet to bring attention to the relocation and should read as follows:

Relocate centerline between Sta._____ and Sta._____.

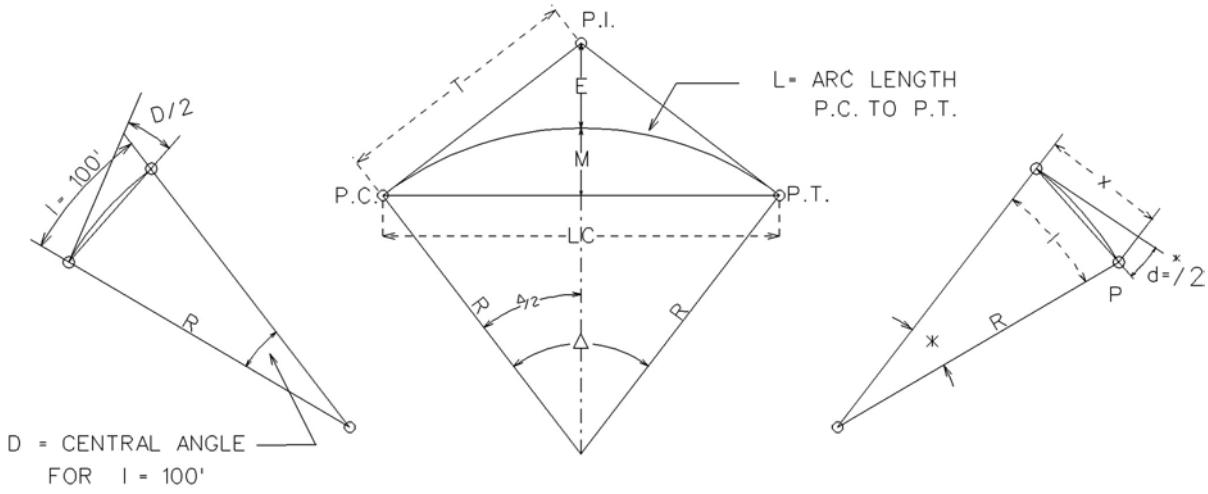
A set of plans with only one or two plan sheets typically will not have a Reference Sheet due to the simple nature of the plan sheets themselves. It will be necessary to show the relocation notes and references on the plan sheets themselves.

The fundamental properties of the circle, as utilized in highway engineering consist of interrelated elements (standard nomenclature) as shown on the following sheet.

1. HORIZONTAL CURVES (CIRCULAR)

The changes in direction along a highway are basically accounted for by curves consisting of portions of a circle. Its principal characteristic is measured by the RADIUS or by a related quality referred to as the DEGREE of curve.

The fundamental properties of the circle, as utilized in highway engineering consist of interrelated elements (standard nomenclature) as shown here:



SYMBOLS

Δ	=	Intersection or Central Angle, Degrees
R	=	Radius of Curve
D	=	Degree of Curve
L	=	Length of Curve
T	=	Tanget Distance
E	=	External Distance
M	=	Middle Ordinate
LC	=	Long Chord
l	=	Length of ARC between any two points on curve
*	=	Central angle subtended by ARC l, degrees
d	=	Deflection angle for any ARC length l, degrees
x	=	Distance along tanget from P. C. or P. T. to set any point P on curve
y	=	Offset from tanget at distance x to set any point P on curve

2. FORMULAS FOR CIRCULAR CURVES

$D = 5729.57795 \div R$

$L = \triangle R \div 57.2958 = 100 \triangle \div D$

$T = R \tan \frac{\triangle}{2}$

$E = \frac{R}{\cos \frac{\triangle}{2}} - R = R \operatorname{exsec} \frac{\triangle}{2}$

$M = R \left(1 - \cos \frac{\triangle}{2}\right) = R \operatorname{vers} \frac{\triangle}{2}$

$LC = 2 R \sin \frac{\triangle}{2}$

$R = (LC^2 + 4M^2) \div 8M$

$l = 100 \measuredangle \div D$

$d = \frac{\measuredangle}{2} = 1718.873\ l \div R$ (IN MINUTES)

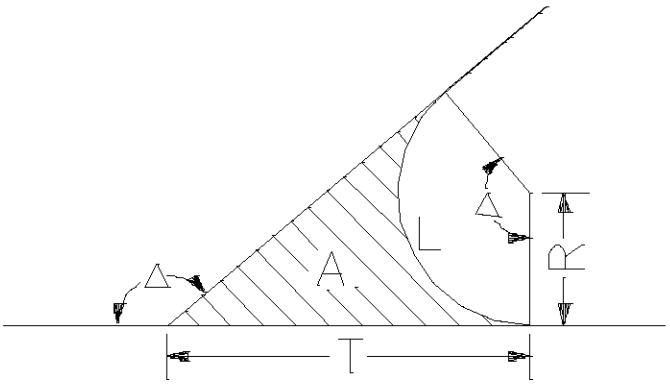
$= 28.64789\ l \div R$ (IN DEGREES)

FOR ANY LENGTH x, $y = R - \sqrt{R^2 - x^2}$

FOR ANY LENGTH l, $x = R \sin \measuredangle$

$y = R (1 - \cos d) = R \operatorname{vers} \measuredangle$

3. SHORT RADIUS CURVE DATA



Δ = CENTRAL ANGLE
R = RADIUS
T = TANGENT DISTANCE
A = EXTERNAL AREA
L = ARC LENGTH

FORMULAS

$$T = R \ TAN \frac{\Delta}{2}$$

$$A = R^2 \left(TAN \frac{\Delta}{2} - \frac{\Delta \pi}{360} \right)$$

$$L = \frac{2 \ X \ \pi \ X \ R \ X \Delta}{360}$$

4. Short Radius Curve Values

Radius		Arc Length per Degree	Length	90º Values External Area
1'		0.017'	1.571'	.21 Sq. Ft.
2		0.035	3.142	.86
3		0.052	4.712	1.93
4		0.070	6.283	3.43
5		0.087	7.854	5.37
6		0.105	9.425	7.73
7		0.122	10.996	10.52
8		0.140	12.566	13.73
9		0.157	14.137	17.38
10		0.175	15.708	21.46
11		0.192	17.279	25.97
12		0.209	18.850	30.90
13		0.227	20.420	36.27
14		0.244	21.991	42.06
15		0.262	23.562	48.29
16		0.279	25.133	54.94
17		0.297	26.704	62.02
18		0.314	28.274	69.53
19		0.332	29.845	77.47
20		0.249	31.416	85.84
21		0.367	32.987	94.64
22		0.384	34.558	103.87
23		0.401	36.128	113.52
24		0.419	37.699	123.61
25		0.436	39.270	134.13
26		0.454	40.841	145.07
27		0.471	42.412	156.44
28		0.489	43.982	168.25
29		0.506	45.553	180.48
30		0.524	47.124	193.14
31		0.541	48.695	206.23
32		0.558	50.266	219.75
33		0.576	51.836	233.70
34		0.593	53.407	248.08
35		0.611	54.978	262.89

Short Radius Curve Values (cont.)

Radius		Arc Length per Degree	Length	90º Values External Area
36		0.628	56.549	278.12 Sq. Ft.
37		0.646	58.120	293.79
38		0.663	59.690	309.88
39		0.681	61.261	326.41
40		0.698	62.832	343.36
41		0.716	64.403	360.74
42		0.733	65.974	378.55
43		0.750	67.544	396.80
44		0.768	69.115	415.47
45		0.785	70.686	434.57
46		0.803	72.257	454.09
47		0.820	73.828	474.05
48		0.838	75.398	494.44
49		0.855	76.969	515.25
50		0.873	78.540	536.50
60		1.047	94.41	
70		1.221	109.89	
75		1.309	117.81	
90		1.571	141.39	
100		1.745	157.05	
125		2.182	196.38	
150		2.618	235.62	
175		3.054	274.86	
200		3.491	314.19	

5. Maximum Degree of Curve for Design Speed

Design Speed MPH	Max Table 0.04 D	Max Table 0.06 D	Max Table 0.08 D
10	188º 27'	205º 35'	222º 43'
11	155º 44'	169º 54'	184º 03'
12	130º 52'	142º 46'	154º 40'
13	111º 30'	121º 39'	131º 47'
14	93º 57'	102º 42'	107º 04'
15	81º 51'	89º 28'	93º 16'
16	71º 56'	78º 38'	81º 58'
17	62º 14'	68º 10'	74º 06'
18	55º 31'	60º 48'	66º 06'
19	49º 50'	54º 35'	59º 19'
20	44º 58'	49º 15'	53º 32'
21	40º 47'	44º 41'	48º 34'
22	37º 10'	40º 42'	44º 15'
23	34º 00'	37º 15'	40º 29'
24	30º 29'	33º 28'	36º 26'
25	28º 06'	30º 50'	33º 35'
26	25º 59'	28º 31'	31º 03'
27	23º 30'	25º 51'	28º 12'
28	21º 51'	24º 02'	26º 13'
29	20º 22'	22º 24'	24º 27'
30	19º 02'	20º 56'	22º 51'
31	17º 50'	19º 37'	21º 24'
32	16º 44'	18º 24'	20º 04'
33	15º 44'	17º 18'	18º 53'
34	14º 27'	15º 56'	17º 25'
35	13º 38'	15º 02'	16º 26'
36	12º 53'	14º 12'	15º 32'
37	11º 53'	13º 08'	14º 23'
38	11º 16'	12º 27'	13º 39'
39	40º 42'	11º 50'	12º 57'
40	10º 10'	11º 15'	12º 19'
41	9º 41'	10º 42'	11º 43'
42	9º 14'	10º 12'	10º 10'
43	8º 48'	9º 44'	10º 39'
44	8º 11'	9º 04'	9º 54'
45	7º 50'	8º 40'	9º 31'
46	7º 29'	8º 18'	9º 07'
47	6º 59'	7º 45'	8º 32'
48	6º 41'	7º 26'	8º 11'
49	6º 25'	7º 08'	7º 51'
50	6º10'	6º 51'	7º 32'

Maximum Degree of Curve for Design Speed (cont.)

Design Speed MPH	Max Table 0.04 D	Max Table 0.06 D	Max Table 0.08 D
51	5º 56'	6º 25'	7º 15'
52	5º 33'	6º 11'	6º 49'
53	5º 20'	5º 57'	6º 33'
54	5º 00'	5º 35'	6º 10'
55	4º 49'	5º 23'	5º 57'
56	4º 38'	5º 11'	5º 44'
57	4º 21'	4º 53'	5º 24'
58	4º 12'	4º 42'	5º 13'
59	3º 56'	4º 26'	4º 55'
60	3º 48'	4º 17'	4º 45'
61	3º 41'	4º 09'	4º 36'
62	3º 27'	3º 54'	4º 21'
63	3º 20'	3º 46'	4º 12'
64	3º 08'	3º 33'	3º 58'
65	3º 02	3º 27'	3º 51'
70	2º 27	2º 48'	3º 0º'

Plan Preparation Guide

Chapter 7

Design - Channelization

1. Horizontal Roadway Design

SCDOT horizontal roadway design shall be as set forth in the following manuals:

a. SCDOT Highway Design Manual
b. SCDOT Access and Roadside Management Standards
c. SCDOT Standard Drawings for Road Construction
d. AASHTO A Policy on Geometric Design of Highways and Street (Green Book)
e. AASHTO Roadside Design Guide
f. Memorandums superceding portions of the above manuals

2. Traffic Lane Lines

On projects where a valley gutter lip is proposed or where a portion of the shoulder is to be paved only the travel lane (s) shall be shown on the plans. The edge of paved shoulder or lip shall not be shown except where a variation from the typical section is necessary. The typical section should show the travel lane and dimension.

The Preliminary Design Section will provide the edge of pavement (EOP) line, in all cases. Preliminary Design is showing the EOP line on all projects including those with curb and gutter. This should enhance the automation of creating the templates for the project. For the plan sheet, the EOP line should be paralleled with a FOC line available in the custom line style palette called "FOC". Back of curb line will not be shown in any case. When there is grass plot, the front edge of the sidewalk will be shown. In all cases, the back of the sidewalk will be shown.

The radius dimensions will be drawn to the EOP line on the plans as shown on Sheet No. 7-7. For clarification, a cell has been created to demonstrate the radius measurement. It should be used on each plan sheet, where applicable, to emphasize the measurement location. It can be found in the cell libraries under the name: marker.

In order for the FOC line style to be legible for different scales and types of projects several guidelines should be followed.

1. New Edge of Pavement Weight = 6
2. FOC line style weight = 3
3. Sidewalk line and pattern weight = 3
4. Fill under view attributes should be on
5. The scale factor toggle on the custom line palette will vary for english projects
   The following are the appropriate scale factors for different projects:
   English
   20:1 Scale Factor = 1
   50:1 Scale Factor = 1.5
6. Consideration should be given to the orientation of the integral label of the FOC line.

See sheet 7-3 and 7-7 for an example.

3. Concrete Sidewalk

When concrete sidewalk is designated on plans, it is to be drawn at the correct location, labeled and patterned. When sidewalk is used in areas of high pedestrian traffic, particularly in area of schools, consideration should be given requiring curb and gutter adjacent to sidewalk. A valley gutter section with sidewalk should be discouraged in high pedestrian traffic areas.

If during the field review a valley gutter with sidewalk is recommended, the Project Development Engineer or Program Manager must approve the concept by initialing and dating the proposed design. Their Approval shall be required prior to proceeding with plan preparation.

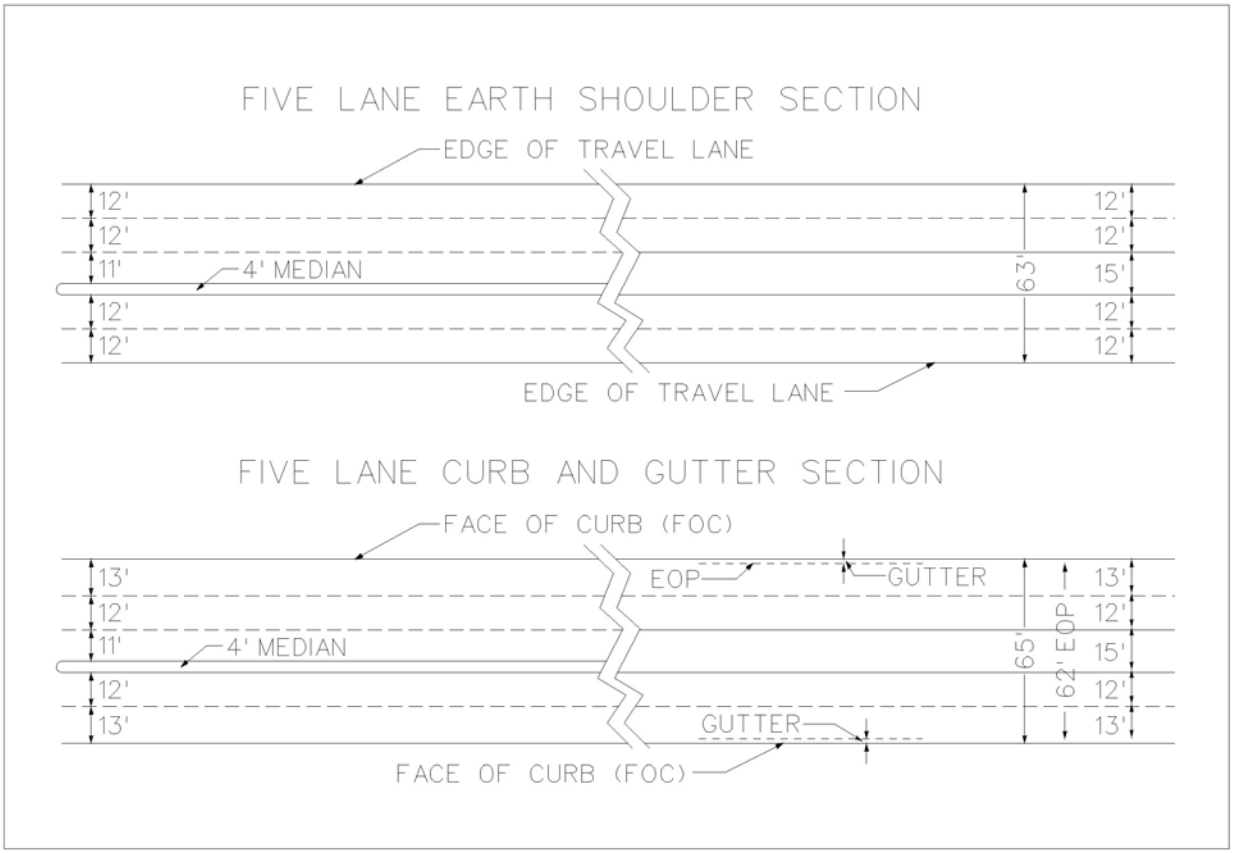
In order to comply with the Americans with Disabilities Act, the width of a standard concrete sidewalk has increased from 4.5' to a width of 5.0'. When plotting an earth sidewalk area, the width of this area is increased accordingly.

Where crosswalks have been marked and sidewalks are a feature of the mainline roadway, there is sometimes an offset between the sidewalk and the crosswalk as shown as "A" on Attachment I. This results in pedestrians walking on the grass to reach the crosswalk or encourages pedestrians not to use the crosswalk. This can be unsafe for the pedestrians.

On future projects, sidewalks should be extended to the beginning of the corner radius on the adjacent roadway as shown on Attachments I and II as Illustration B. Note extension of sidewalk on Attachment II beyond radius in order to match opposite corner. Sidewalk termini should be discussed on the Design Field Review.

4. Five Lane Sections

Five (5) lane projects should be developed using a 63-foot pavement width with earth shoulders. A five (5) lane curb and gutter section should be developed using a 63 foot pavement width plus 1.5 foot gutter on each side for a total width, face of curb to face of curb, of 66 foot. See following examples.



5. Considerations for Bicycle Facilities

On February 20, 2003, the SCDOT Commission in meeting affirmed that bicycling accommodations should be a routine part of the Department's planning, design, construction, and operating activities, and will be included in the everyday operations of our transportation system. In order to provide guidance to Department personnel, guidelines have been developed for the selection and design of bicycle facilities on all new projects. The following describes shared roadways and bike lanes/paved shoulders and gives guidance on their design requirements for new projects. Please see pages 7-10 through 7-14 for examples of these sections.

Shared Roadways

Shared roadways are the way most bicycle travel in the United States occurs. This type of facility can be used to accommodate bicyclists without signing and striping the roadway for bicycle travel. This type of facility works well to accommodate bicycles through urban areas that are not considered high bicycle-demand corridors or where other constraints do not allow the development of a bike lane/paved shoulder.

On urban sections (curb and gutter), an outside travel lane width of 14 feet is the minimum recommended width for a shared-use lane. The gutter pan is not to be included in the width of the shared roadway. On stretches of roadways with grades greater than five percent, consideration should be given to providing a 15-foot travel lane width. Shared roadway widths greater than 14 feet that extend continuously along a stretch of roadway may encourage the undesirable operation of two motor vehicles, especially in urban areas, and are therefore not recommended as shared use roadways and consideration should be given to striping the additional width. The Department's Pedestrian and Bicycle Coordinator and Traffic Engineering can provide assistance in determining the need for a shared roadway as opposed to bike lanes/paved shoulders.

Bike Lanes/Paved Shoulders

This type of facility incorporates bicyclists into a roadway by utilizing a bike lane/paved shoulder adjacent to the motor vehicle traffic. A bike lane should be a lane specifically signed and marked as indicated in the Manual on Uniform Traffic Control Devices (Part 9). A paved shoulder may be used to accommodate bicycle travel without specific markings and signs present. A bike lane provides for more predictable movements by the motorist and bicyclist. Bike lanes should be one-way facilities and carry bike traffic in the same direction as adjacent motor vehicle traffic. This type of facility should be used where the Department desires to provide continuity to other bicycle facilities or designate preferred routes through high demand corridors, such as any of our designated South Carolina bicycle touring routes or a municipality's bikeway.

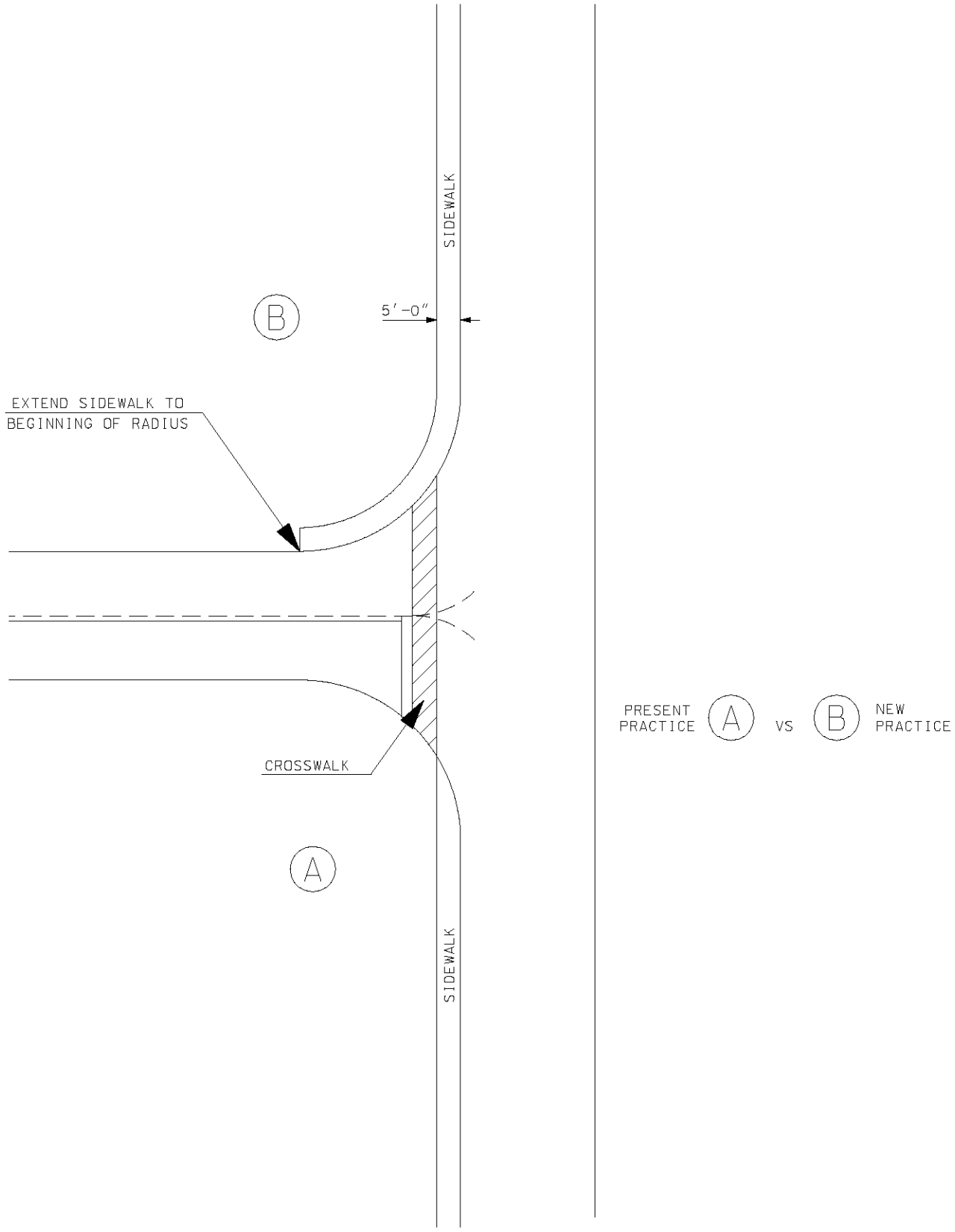
On rural sections (shoulder) with ADT greater than 500, bike lanes/paved shoulders should be a minimum of four feet wide in each direction to accommodate bicycle travel. The bike lanes/paved shoulders will have a cross slope of 24H:1V (4.17%). Where motor vehicle speeds exceed 50 mph or the percentage of trucks, buses, and recreational vehicles are greater than five percent of the ADT, consideration should be given to providing a minimum 6 feet of width to accommodate bicycle travel adjacent to the higher speeds (50 mph or greater) and to lessen the effect of windblast from the larger vehicles.

On rural sections (shoulder) with ADT less than 500, paving 2 feet of the earthen shoulder will be adequate to better accommodate bicyclists.

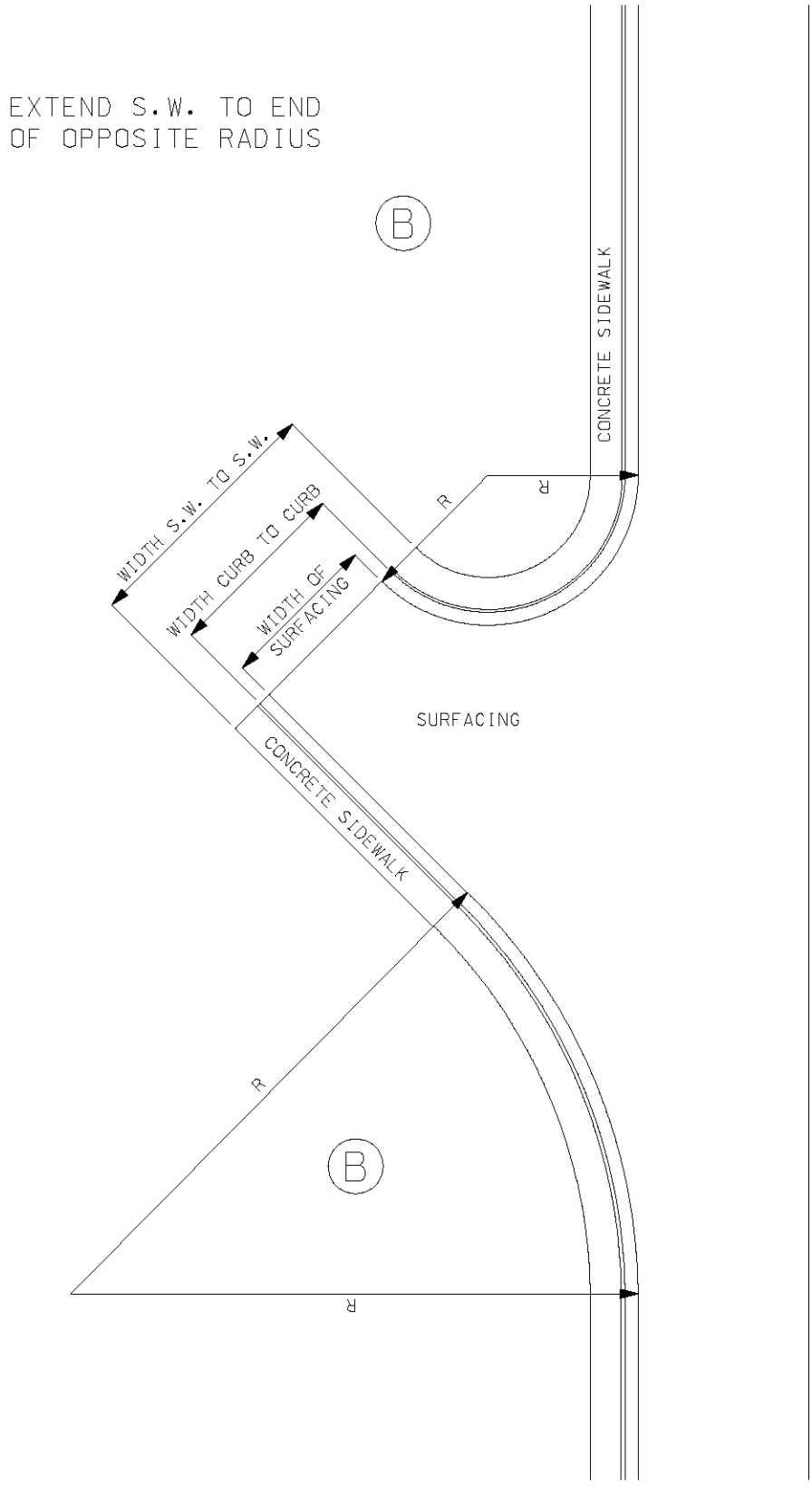
On urban sections (curb and gutter), bike lanes/paved shoulders should be a minimum of 4 feet wide to accommodate bicycle travel. The bike lanes/paved shoulders will have a cross slope of 24H:1V (4.17%). The gutter pan is not to be included in the width of the bike lane/paved shoulder. Where the percentage of trucks, buses, and recreational vehicles are greater than five percent of the ADT, consideration should be given to providing a minimum 6 feet of width. Where motor vehicle speeds are 50 mph or greater, Department guidelines for shoulder widths should be utilized as defined in the SCDOT Highway Design Manual, thus giving the bicyclist either 8 or 10 feet of paved shoulder width to utilize.

The guidelines for shared roadways and bike lanes/paved shoulders will be utilized to accommodate bicycle facilities on roadways with valley gutter. Due to the fact that valley gutter sections are typically used on low volume, two-lane secondary roadways, the cross slope of the paved shoulder/bike lane should be 48H:1V (2.08%).

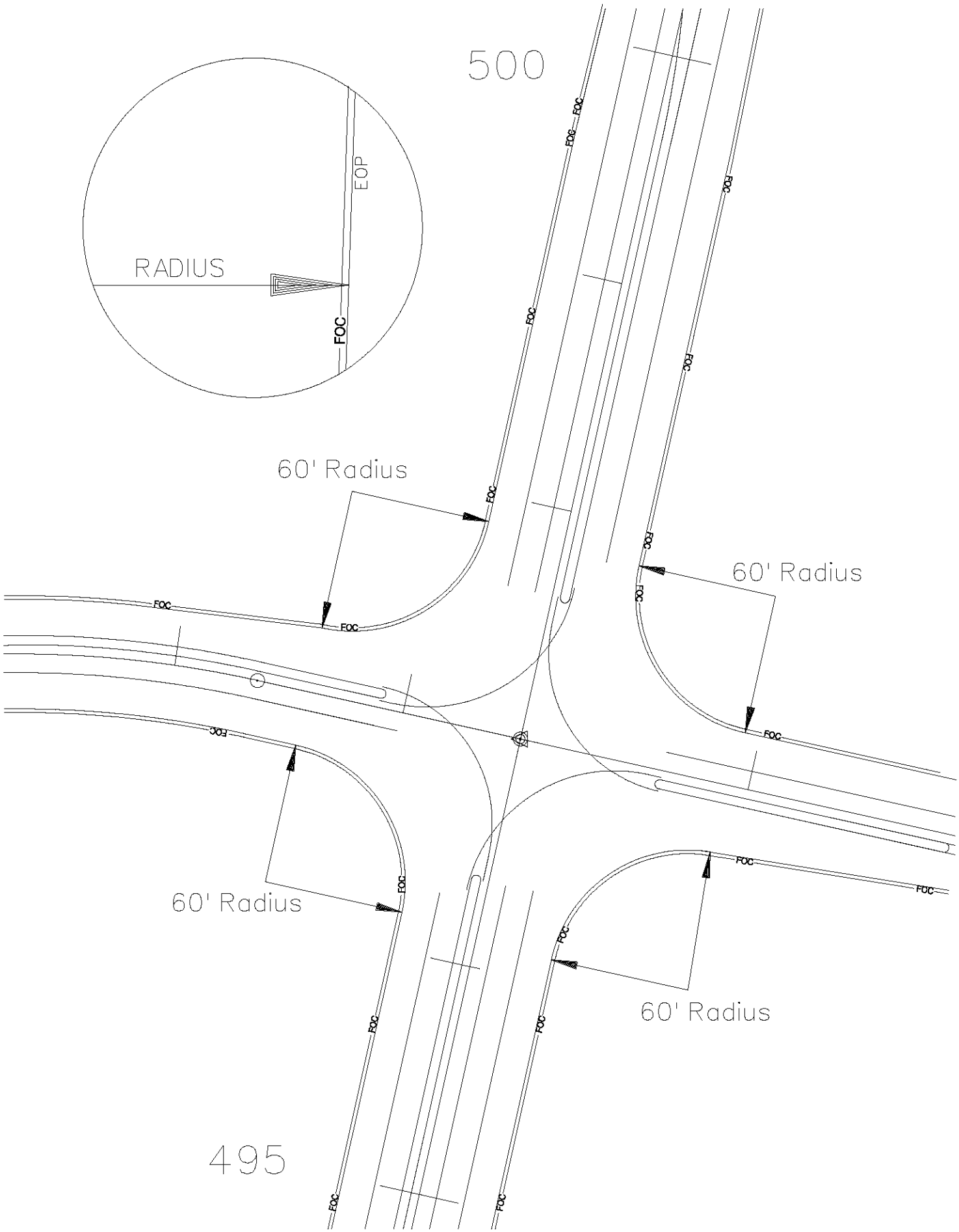
ATTACHMENT I



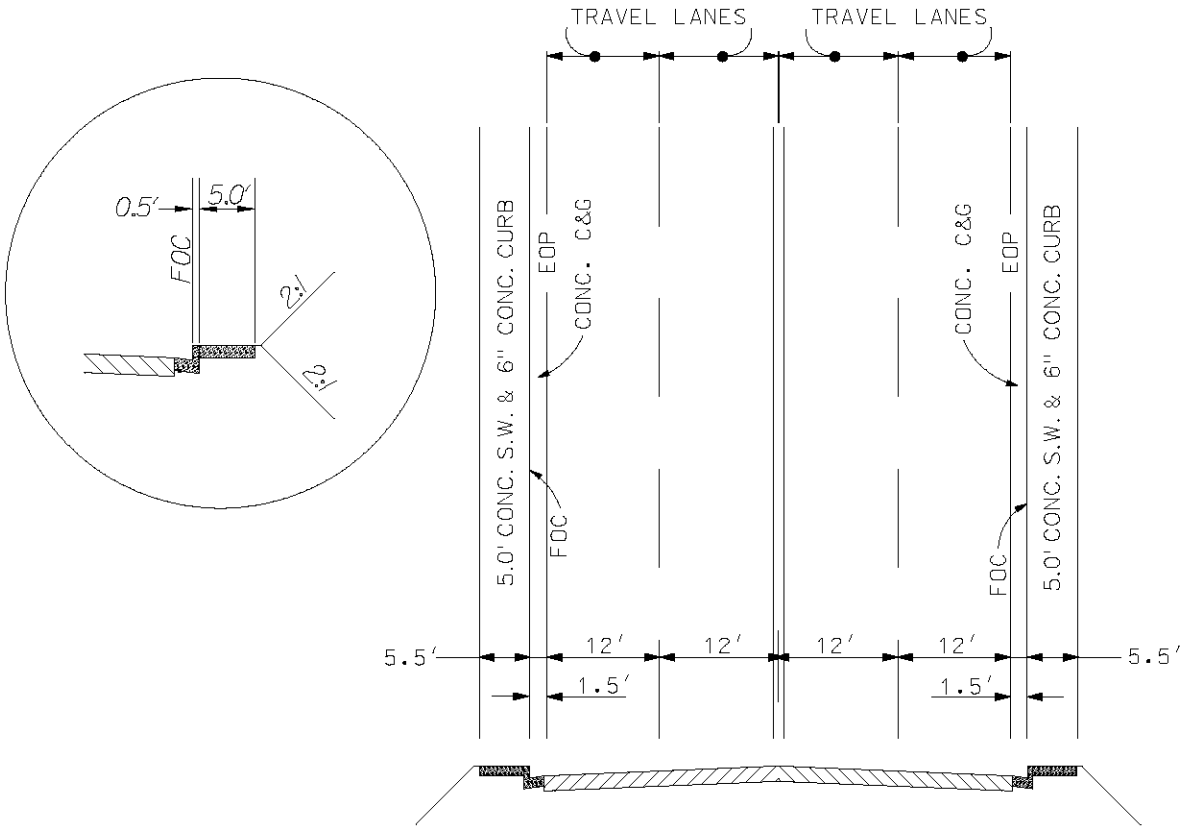
ATTACHMENT II



EXAMPLE OF RADIUS DIMENSIONS

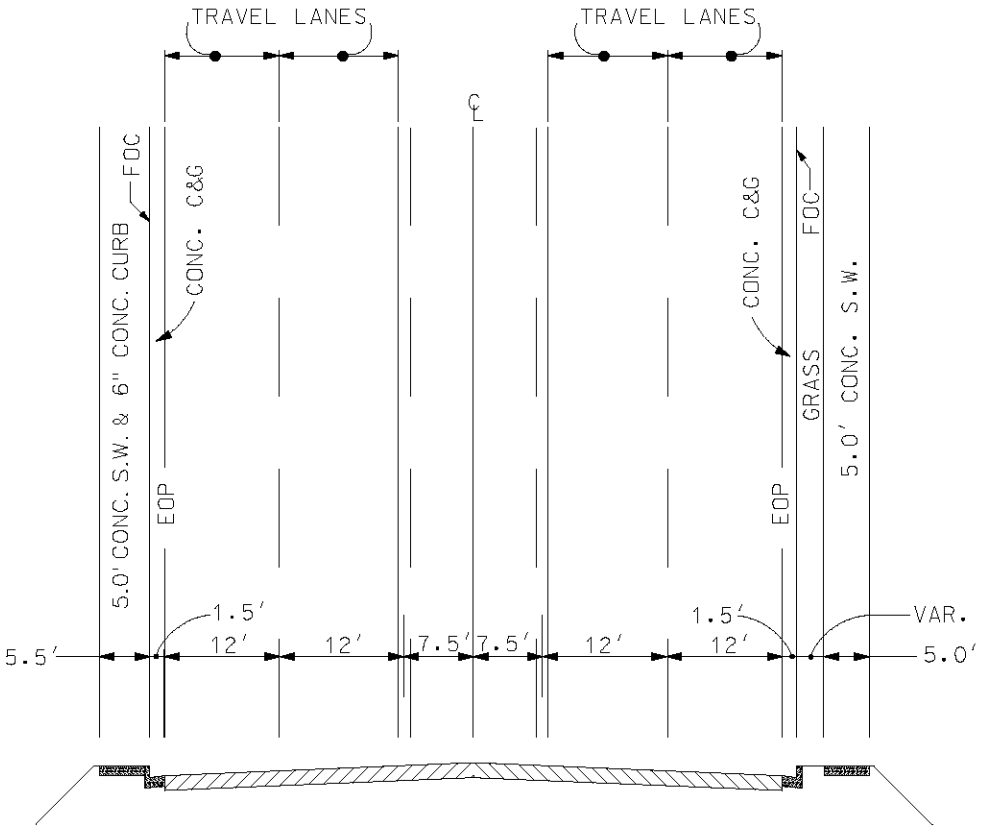


EXAMPLE OF TRAFFIC LANE LINES



CURB & GUTTER

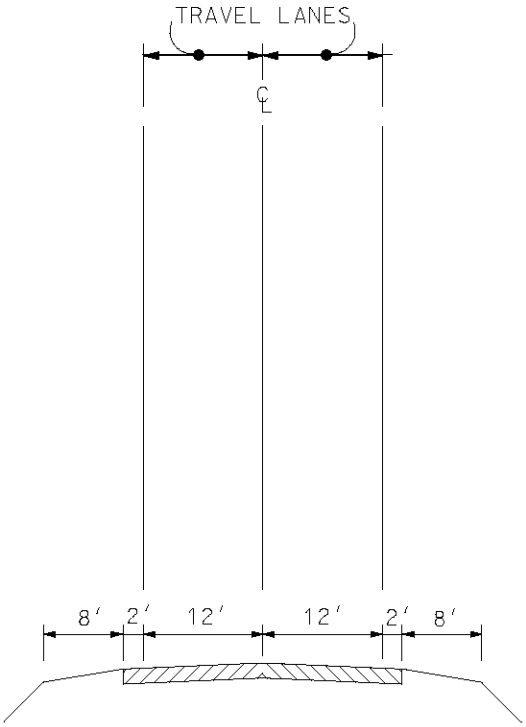
WHEN USING 1"= 50' SCALE



CURB & GUTTER

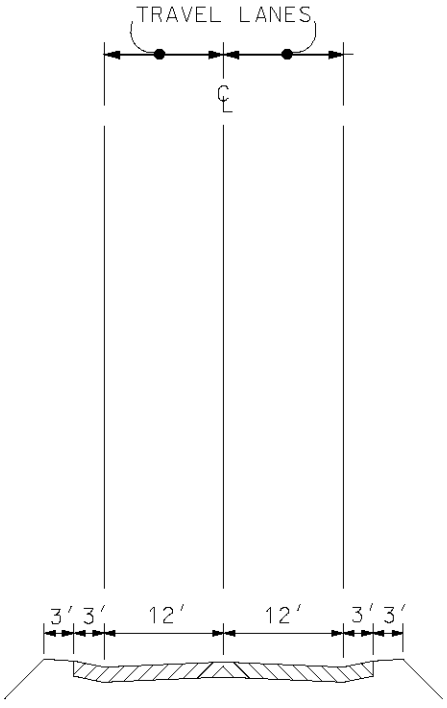
WHEN USING 1"= 20' SCALE

EXAMPLE OF TRAFFIC LANE LINES



SHOULDER SECTION

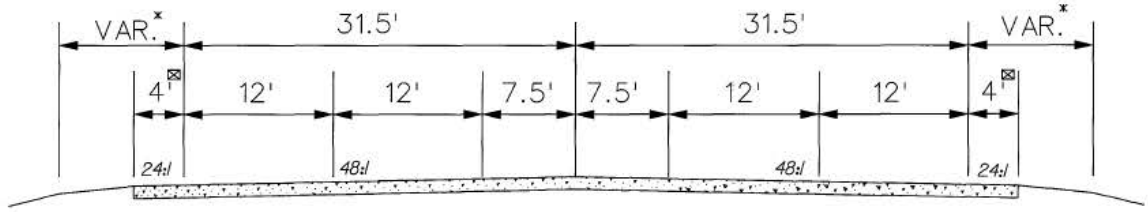
WHEN USING ANY SCALE



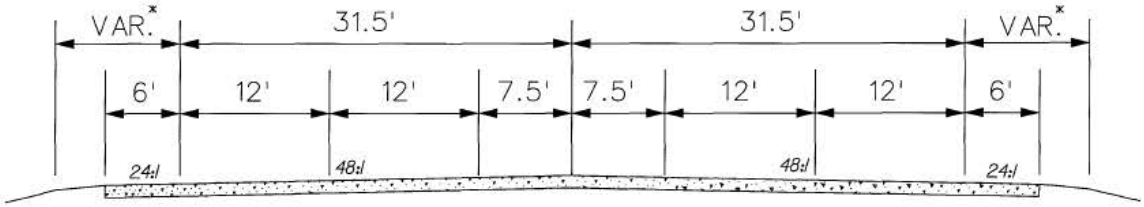
VALLEY GUTTER

WHEN USING ANY SCALE

BICYCLE FACILITIES
NEW CONSTRUCTION
5-LANE RURAL SECTION (SHOULDER)



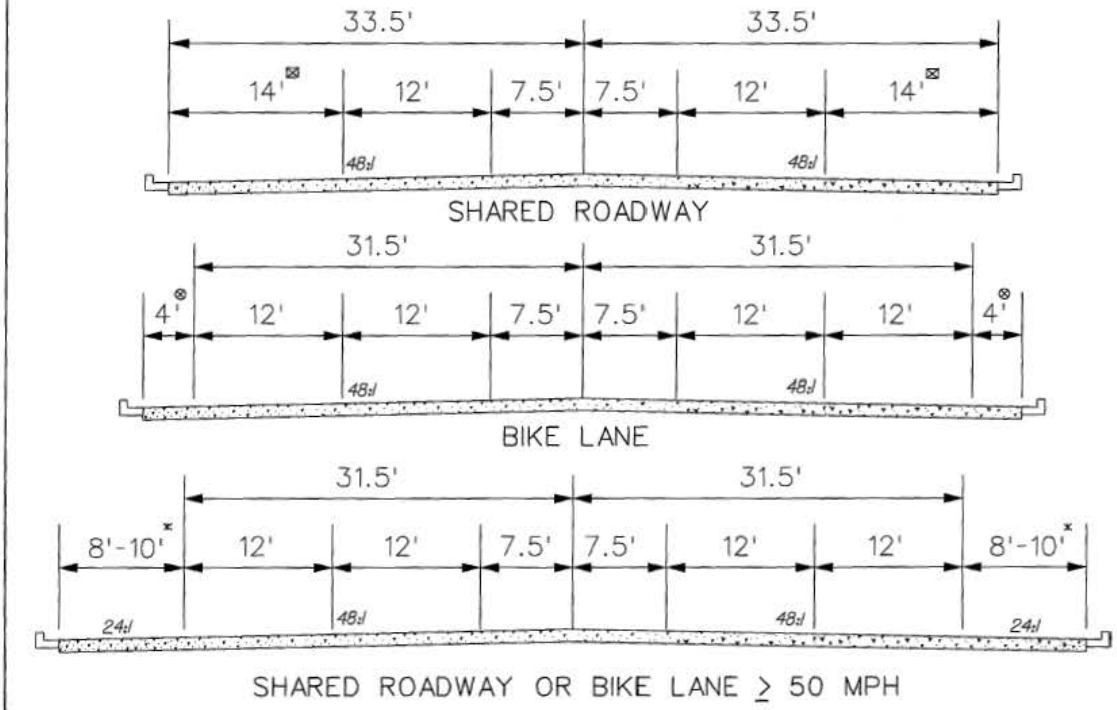
BIKE LANE - POSTED SPEED < 50 MPH OR ≤ 5% TRUCKS



BIKE LANE - POSTED SPEED ≥ 50 MPH OR > 5% TRUCKS

* SHOULDER WIDTH PER SCDOT HIGHWAY DESIGN MANUAL
⊠ USE A 2' PAVED SHOULDER FOR A SHARED ROADWAY

BICYCLE FACILITIES
NEW CONSTRUCTION
5-LANE URBAN SECTION (CURB AND GUTTER)

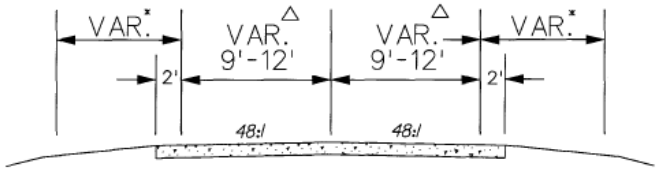


* SHOULDER WIDTH PER SCDOT HIGHWAY DESIGN MANUAL
⊠ CONSIDER USING 15' WHEN GRADES > 5%
⊗ CONSIDER USING 6' WHEN > 5% TRUCKS

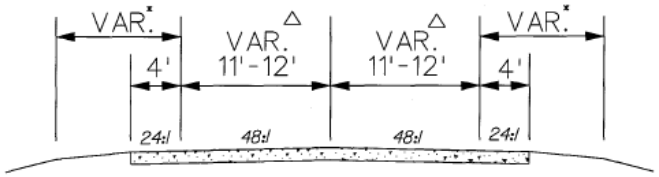
BICYCLE FACILITIES
NEW CONSTRUCTION
2-LANE RURAL SECTION (SHOULDER)

* SHOULDER WIDTH PER SCDOT HIGHWAY DESIGN MANUAL

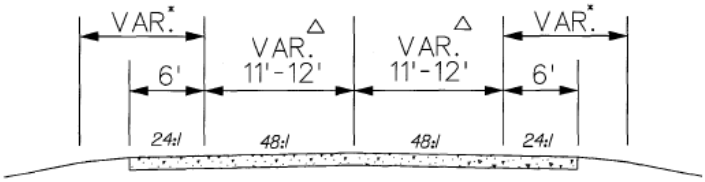
△ LANE WIDTHS PER SCDOT HIGHWAY DESIGN MANUAL



SHARED ROADWAY - LESS THAN 500 ADT

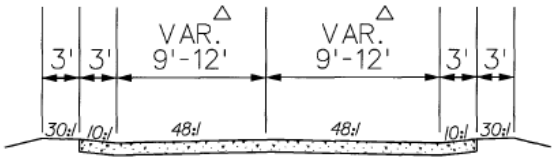


BIKE LANE - POSTED SPEED < 50 MPH OR ≤ 5% TRUCKS

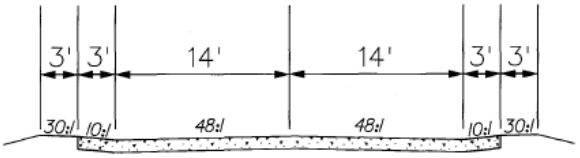


BIKE LANE - POSTED SPEED ≥ 50 MPH OR > 5% TRUCKS

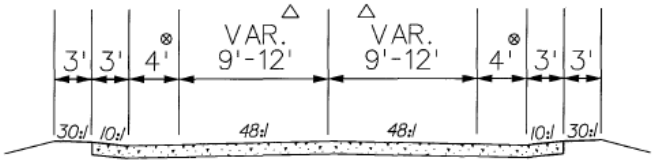
BICYCLE FACILITIES
NEW CONSTRUCTION
2-LANE VALLEY GUTTER SECTIONS



SHARED ROADWAY - LESS THAN 500 ADT



SHARED ROADWAY



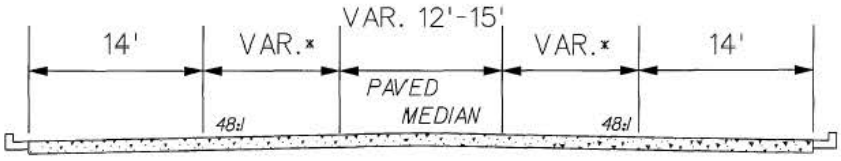
BIKE LANE

△ LANE WIDTHS PER SCDOT HIGHWAY DESIGN MANUAL

⊗ CONSIDER USING 6' WHEN > 5% TRUCKS

BICYCLE FACILITIES
RESTRIPING EXISTING 5-LANE
URBAN SECTION (CURB AND GUTTER)

BIKE LANE



SHARED ROADWAY

* 11'-12' LANE WIDTHS
(ON NATIONAL OR SOUTH CAROLINA TRUCK NETWORK USE 12' MIN. LANE WIDTH)

Plan Preparation Guide

Chapter 8

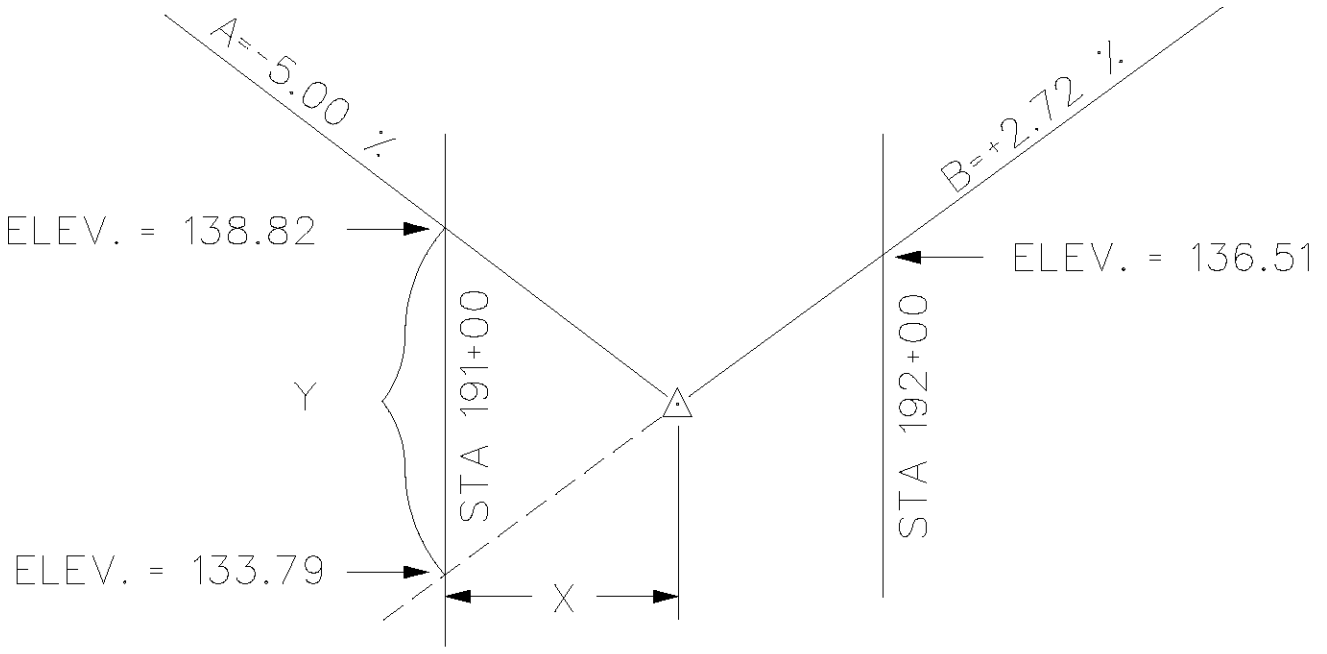
Vertical Alignment – Profile

1. VERTICAL ALIGNMENT

VERTICAL ALIGNMENT OF A ROADWAY WILL BE SHOWN ON A PROFILE SHEET. THIS MAY BE INCLUDED ON THE SAME SHEET AS THE TOPOGRAPHY OF THE ROADWAY OR ON A SEPARATE SHEET (PROFILE ONLY).

THE ROADWAY PROFILE MAY BE ONE SINGLE TANGENT LINE OR A MULTIPLE OF TANGENT LINES OF DIFFERENT PLUS OR MINUS PERCENTS OF GRADES WITH VERTICAL CURVES AT THE POINTS OF INTERSECTION. THE LENGTH OF VERTICAL CURVES ARE DETERMINED BY THE DESIGN SPEED OF THE ROADWAY BEING CONSTR-UCTED. THESE VERTICAL CURVES MAY BE CREST (HIGH POINT OF TWO TANGENT GRADES) OR SAG (LOW POINT OF TWO TANGENT GRADES).

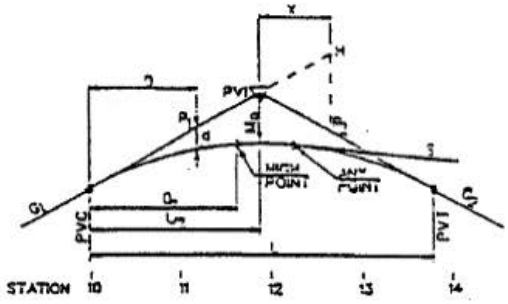
2. METHOD OF COMPUTING ODD POINT OF INTERSECTION

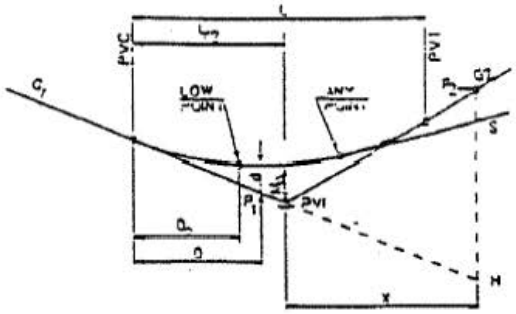


$$X = \frac{Y}{\text{ALGEBRAIC DIFF. IN GRADES}} = \frac{5.03}{7.72} = 0.6516$$

P.I. STA. = 191+65.16

3. PROPERTIES OF VERTICAL CURVES





L = Length of curve in 100 foot units or stations;

G_1 = First grade in percent;

G_2 = Second grade in percent;

M_o = Middle ordinate in feet;

d = Correction from tangent grade line to curve in feet;

D = Distance from PVC or PVT to any point on curve in stations;

S = Slope of the tangent to the curve at any point in percent;

X = Distance from P_2 to PVI in feet;

H = Elevation of grade G_1 produced at station of P_2;

P_1 = Elevation on respective grade;

P_2 = Elevation on respective grade;

D_o = Distance to low or high point from extremity of curve in stations.

A rising grade carries a plus sign while a falling grade carriers a minus sign.

$$M_o = (G_1 - G_2)\frac{L}{8}$$

$$M_o = \frac{1}{2}\left(\frac{Elev\ PVC + Elev\ PVT}{2} - Elev\ PVI\right)$$

$$d = M_o\left(\frac{D}{0.5L}\right)^2 = D^2\left(\frac{4M_o}{L^2}\right)$$

$$d = \frac{D^2(G_1 - G_2)}{2L}$$

$$X = \frac{100\,(Elev\ H - Elev\ P_2)}{(G_1 - G_2)}$$

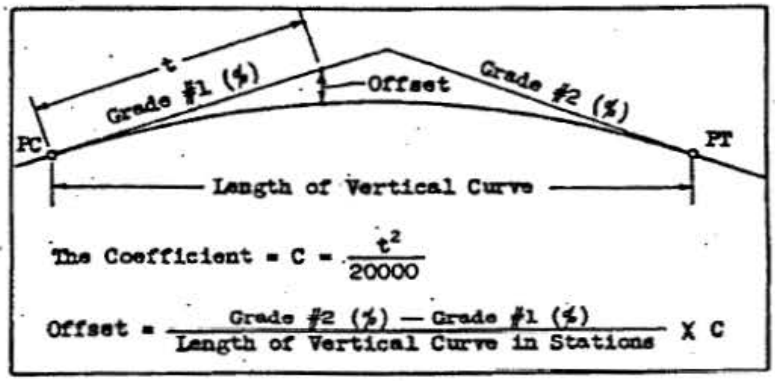
$$S = G_1 - D\left(\frac{G_1 - G_2}{L}\right)$$

$$D_o = \frac{L\,G_1}{(G_1 - G_2)}$$

COEFFICIENTS FOR TANGENT OFFSETS TO VERTICAL CURVES

THERE ARE MANY WAYS OF COMPUTING TANGENT OFFSETS FOR PARABOLIC CURVES, AMONG THEM THE SLIDE RULE METHOD AND THE DESK CALCULATOR METHOD. THIS PAMPHLET CONTAINS TABLES WHICH WILL PERMIT THEIR CALCULATION BY MEANS OF COEFFICIENTS FOLLOWING A METHOD PREFERRED BY SOME ENGINEERS. THE OFFSET FROM TANGENT TO CURVE AT ANY POINT IS OBTAINED BY MULTIPLYING THE COEFFICIENT LISTED IN THE TABLE FOR THE TANGENT DISTANCE TO THAT POINT BY THE QUOTIENT OF THE ALGEBRAIC DIFFERENCE OF THE TWO TANGENT GRADES DIVIDED BY THE LENGTH OF VERTICAL CURVE.

THESE TABLES WERE GENERATED ON AN ELECTRONIC COMPUTER.



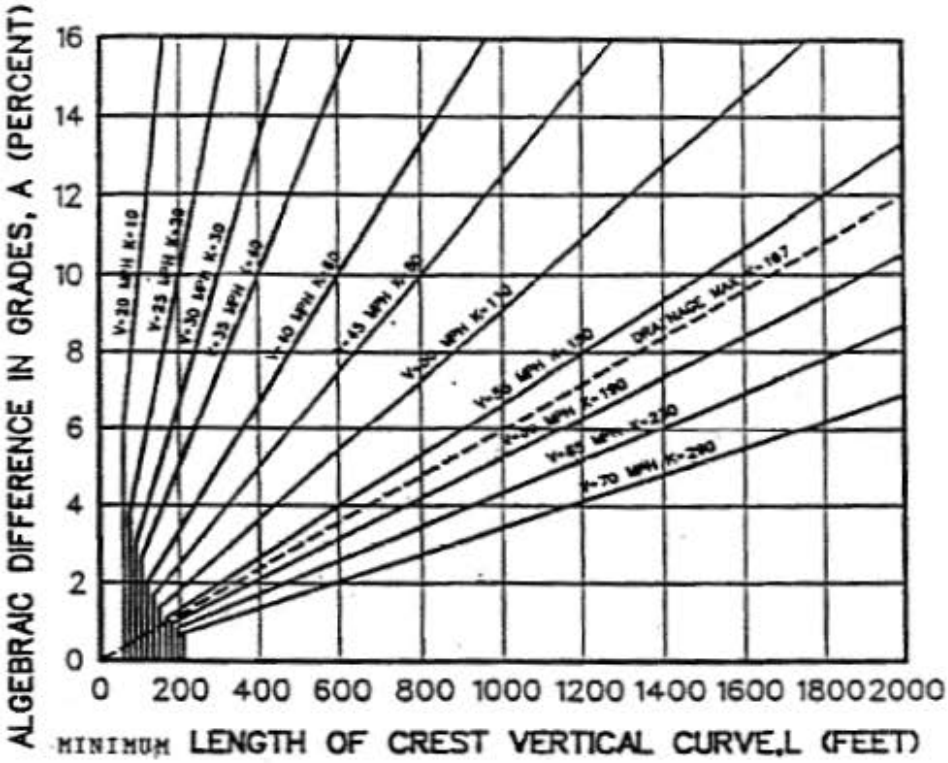
THE SYMBOLS SHOWN IN THE ABOVE SKETCH AND FORMULAS PROVIDE THE REFERENCE TO NOMENCLATURE USED IN THE TABLES.

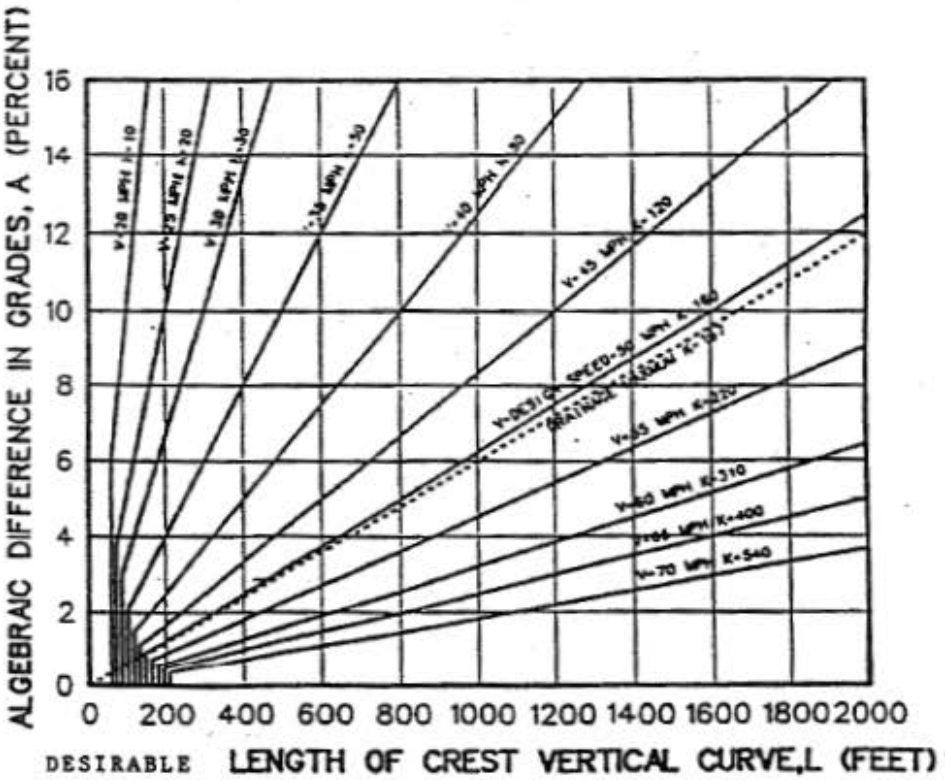
t in ft.	C	t in ft.	C	t in ft.	C	t in ft.	C	t in ft.	C
1	.00005	101	.52005	201	1.02005	301	4.33005	401	8.04005
2	.00020	102	.52020	202	1.04020	302	4.36020	402	8.08020
3	.00045	103	.53045	203	1.06045	303	4.39045	403	8.12045
4	.00080	104	.54080	204	1.08080	304	4.42080	404	8.16080
5	.00125	105	.55125	205	1.10125	305	4.45125	405	8.20125
6	.00180	106	.56180	206	1.12180	306	4.48180	406	8.24180
7	.00245	107	.57245	207	1.14245	307	4.51245	407	8.28245
8	.00320	108	.58320	208	1.16320	308	4.54320	408	8.32320
9	.00405	109	.59405	209	1.18405	309	4.57405	409	8.36405
10	.00500	110	.60500	210	1.20500	310	4.60500	410	8.40500
11	.00605	111	.61605	211	1.22605	311	4.63605	411	8.44605
12	.00720	112	.62720	212	1.24720	312	4.66720	412	8.48720
13	.00845	113	.63845	213	1.26845	313	4.69845	413	8.52845
14	.00980	114	.64980	214	1.28980	314	4.72980	414	8.56980
15	.01125	115	.66125	215	1.31125	315	4.76125	415	8.61125
16	.01280	116	.67280	216	1.33280	316	4.79280	416	8.65280
17	.01445	117	.68445	217	1.35445	317	4.82445	417	8.69445
18	.01620	118	.69620	218	1.37620	318	4.85620	418	8.73620
19	.01805	119	.70805	219	1.39805	319	4.88805	419	8.77805
20	.02000	120	.72000	220	1.42000	320	4.92000	420	8.82000
21	.02205	121	.73205	221	1.44205	321	4.95205	421	8.86205
22	.02420	122	.74420	222	1.46420	322	4.98420	422	8.90420
23	.02645	123	.75645	223	1.48645	323	5.01645	423	8.94645
24	.02880	124	.76880	224	1.50880	324	5.04880	424	8.98880
25	.03125	125	.78125	225	1.53125	325	5.08125	425	9.03125
26	.03380	126	.79380	226	1.55380	326	5.11380	426	9.07380
27	.03645	127	.80645	227	1.57645	327	5.14645	427	9.11645
28	.03920	128	.81920	228	1.59920	328	5.17920	428	9.15920
29	.04205	129	.83205	229	1.62205	329	5.21205	429	9.20205
30	.04500	130	.84500	230	1.64500	330	5.24500	430	9.24500
31	.04805	131	.85805	231	1.66805	331	5.27805	431	9.28805
32	.05120	132	.87120	232	1.69120	332	5.31120	432	9.33120
33	.05445	133	.88445	233	1.71445	333	5.34445	433	9.37445
34	.05780	134	.89780	234	1.73780	334	5.37780	434	9.41780
35	.06125	135	.91125	235	1.76125	335	5.41125	435	9.46125
36	.06480	136	.92480	236	1.78480	336	5.44480	436	9.50480
37	.06845	137	.93845	237	1.80845	337	5.47845	437	9.54845
38	.07220	138	.95220	238	1.83220	338	5.51220	438	9.59220
39	.07605	139	.96605	239	1.85605	339	5.54605	439	9.63605
40	.08000	140	.98000	240	1.88000	340	5.58000	440	9.68000
41	.08405	141	.99405	241	1.90405	341	5.61405	441	9.72405
42	.08820	142	1.00820	242	1.92820	342	5.64820	442	9.76820
43	.09245	143	1.02245	243	1.95245	343	5.68245	443	9.81245
44	.09680	144	1.03680	244	1.97680	344	5.71680	444	9.85680
45	.10125	145	1.05125	245	2.00125	345	5.75125	445	9.90125
46	.10580	146	1.06580	246	2.02580	346	5.78580	446	9.94580
47	.11045	147	1.08045	247	2.05045	347	6.82045	447	9.99045
48	.11520	148	1.09520	248	2.07520	348	6.85520	448	10.03520
49	.12005	149	1.11005	249	2.10005	349	6.89005	449	10.08005
50	.12500	150	1.12500	250	2.12500	350	6.92500	450	10.12500
51	.13005	151	1.14005	251	2.15005	351	6.96005	451	10.17005
52	.13520	152	1.15520	252	2.17520	352	6.99520	452	10.21520
53	.14045	153	1.17045	253	2.20045	353	7.03045	453	10.26045
54	.14580	154	1.18580	254	2.22580	354	7.06580	454	10.30580
55	.15125	155	1.20125	255	2.25125	355	7.10125	455	10.35125
56	.15680	156	1.21680	256	2.27680	356	7.13680	456	10.39680
57	.16245	157	1.23245	257	2.30245	357	7.17245	457	10.44245
58	.16820	158	1.24820	258	2.32820	358	7.20820	458	10.48820
59	.17405	159	1.26405	259	2.35405	359	7.24405	459	10.53405
60	.18000	160	1.28000	260	2.38000	360	7.28000	460	10.58000
61	.18605	161	1.29605	261	2.40605	361	7.31605	461	10.62605
62	.19220	162	1.31220	262	2.43220	362	7.35220	462	10.67220
63	.19845	163	1.32845	263	2.45845	363	7.38845	463	10.71845
64	.20480	164	1.34480	264	2.48480	364	7.42480	464	10.76480
65	.21125	165	1.36125	265	2.51125	365	7.46125	465	10.81125
66	.21780	166	1.37780	266	2.53780	366	7.49780	466	10.85780
67	.22445	167	1.39445	267	2.56445	367	7.53445	467	10.90445
68	.23120	168	1.41120	268	2.59120	368	7.57120	468	10.95120
69	.23805	169	1.42805	269	2.61805	369	7.60805	469	10.99805
70	.24500	170	1.44500	270	2.64500	370	7.64500	470	11.04500
71	.25205	171	1.46205	271	2.67205	371	7.68205	471	11.09205
72	.25920	172	1.47920	272	2.69920	372	7.71920	472	11.13920
73	.26645	173	1.49645	273	2.72645	373	7.75645	473	11.18645
74	.27380	174	1.51380	274	2.75380	374	7.79380	474	11.23380
75	.28125	175	1.53125	275	2.78125	375	7.83125	475	11.28125
76	.28880	176	1.54880	276	2.80880	376	7.86880	476	11.32880
77	.29645	177	1.56645	277	2.83645	377	7.90645	477	11.37645
78	.30420	178	1.58420	278	2.86420	378	7.94420	478	11.42420
79	.31205	179	1.60205	279	2.89205	379	7.98205	479	11.47205
80	.32000	180	1.62000	280	2.92000	380	8.02000	480	11.52000
81	.32805	181	1.63805	281	2.94805	381	8.05805	481	11.56805
82	.33620	182	1.65620	282	2.97620	382	8.09620	482	11.61620
83	.34445	183	1.67445	283	3.00445	383	8.13445	483	11.66445
84	.35280	184	1.69280	284	3.03280	384	8.17280	484	11.71280
85	.36125	185	1.71125	285	3.06125	385	8.21125	485	11.76125
86	.36980	186	1.72980	286	3.08980	386	8.24980	486	11.80980
87	.37845	187	1.74845	287	3.11845	387	8.28845	487	11.85845
88	.38720	188	1.76720	288	3.14720	388	8.32720	488	11.90720
89	.39605	189	1.78605	289	3.17605	389	8.36605	489	11.95605
90	.40500	190	1.80500	290	3.20500	390	8.40500	490	12.00500
91	.41405	191	1.82405	291	3.23405	391	8.44405	491	12.05405
92	.42320	192	1.84320	292	3.26320	392	8.48320	492	12.10320
93	.43245	193	1.86245	293	3.29245	393	8.52245	493	12.15245
94	.44180	194	1.88180	294	3.32180	394	8.56180	494	12.20180
95	.45125	195	1.90125	295	3.35125	395	8.60125	495	12.25125
96	.46080	196	1.92080	296	3.38080	396	8.64080	496	12.30080
97	.47045	197	1.94045	297	3.41045	397	8.68045	497	12.35045
98	.48020	198	1.96020	298	3.44020	398	8.72020	498	12.40020
99	.49005	199	1.98005	299	3.47005	399	8.76005	499	12.45005
100	.50000	200	2.00000	300	3.50000	400	8.80000	500	12.50000

t in ft.	C	t in ft.	C	t in ft.	C	t in ft.	C	t in ft.	C
501	12.59905	601	15.06095	701	24.59905	801	32.99995	901	40.39905
502	12.60020	602	15.12020	702	24.66020	802	33.06020	902	40.46020
503	12.64645	603	15.18045	703	24.71045	803	33.12045	903	40.52045
504	12.70480	604	15.24080	704	24.78080	804	33.18080	904	40.58080
505	12.75125	605	15.30125	705	24.83125	805	33.24125	905	40.65125
506	12.80180	606	15.36180	706	24.92180	806	33.30180	906	41.04180
507	12.85245	607	15.42245	707	24.99245	807	33.36245	907	41.12245
508	12.90320	608	15.48320	708	25.06320	808	33.44320	908	41.22320
509	12.95405	609	15.54405	709	25.13405	809	33.52405	909	41.33405
510	13.00500	610	15.60500	710	25.20500	810	33.60500	910	41.40500
511	13.05605	611	15.66605	711	25.27605	811	33.68605	911	41.49605
512	13.10720	612	15.72720	712	25.34720	812	33.76720	912	41.58720
513	13.15845	613	15.78845	713	25.41845	813	33.84845	913	41.67845
514	13.20980	614	15.84980	714	25.48980	814	33.92980	914	41.76980
515	13.26125	615	15.91125	715	25.56125	815	34.01125	915	41.86125
516	13.31280	616	15.97280	716	25.63280	816	34.09280	916	41.95280
517	13.36445	617	16.03445	717	25.70445	817	34.17445	917	42.04445
518	13.41620	618	16.09620	718	25.77620	818	34.25620	918	42.13620
519	13.46805	619	16.15805	719	25.84805	819	34.33805	919	42.22805
520	13.52000	620	16.22000	720	25.92000	820	34.42000	920	42.32000
521	13.57205	621	16.28205	721	25.99205	821	34.50205	921	42.41205
522	13.62420	622	16.34420	722	26.06420	822	34.58420	922	42.50420
523	13.67645	623	16.40645	723	26.13645	823	34.66645	923	42.59645
524	13.72880	624	16.46880	724	26.20880	824	34.74880	924	42.68880
525	13.78125	625	16.53125	725	26.28125	825	34.83125	925	42.78125
526	13.83380	626	16.59380	726	26.35380	826	34.91380	926	42.87380
527	13.88645	627	16.65645	727	26.42645	827	34.99645	927	42.96645
528	13.93920	628	16.71920	728	26.49920	828	35.07920	928	43.05920
529	13.99205	629	16.78205	729	26.57205	829	35.16205	929	43.15205
530	14.04500	630	16.84500	730	26.64500	830	35.24500	930	43.24500
531	14.09805	631	16.90805	731	26.71805	831	35.32805	931	43.33805
532	14.15120	632	16.97120	732	26.79120	832	35.41120	932	43.43120
533	14.20445	633	17.03445	733	26.86445	833	35.49445	933	43.52445
534	14.25780	634	17.09780	734	26.93780	834	35.57780	934	43.61780
535	14.31125	635	17.16125	735	27.01125	835	35.66125	935	43.71125
536	14.36480	636	17.22480	736	27.08480	836	35.74480	936	43.80480
537	14.41845	637	17.28845	737	27.15845	837	35.82845	937	43.89845
538	14.47220	638	17.35220	738	27.23220	838	35.91220	938	43.99220
539	14.52605	639	17.41605	739	27.30605	839	35.99605	939	44.08605
540	14.58000	640	17.48000	740	27.38000	840	36.08000	940	44.18000
541	14.63405	641	17.54405	741	27.45405	841	36.16405	941	44.27405
542	14.68820	642	17.60820	742	27.52820	842	36.24820	942	44.36820
543	14.74245	643	17.67245	743	27.60245	843	36.33245	943	44.46245
544	14.79680	644	17.73680	744	27.67680	844	36.41680	944	44.55680
545	14.85125	645	17.80125	745	27.75125	845	36.50125	945	44.65125
546	14.90580	646	17.86580	746	27.82580	846	36.58580	946	44.74580
547	14.96045	647	17.93045	747	27.90045	847	36.67045	947	44.84045
548	15.01520	648	17.99520	748	27.97520	848	36.75520	948	44.93520
549	15.07005	649	18.06005	749	28.05005	849	36.84005	949	45.03005
550	15.12500	650	18.12500	750	28.12500	850	36.92500	950	45.12500
551	15.18005	651	18.19005	751	28.20005	851	37.01005	951	45.22005
552	15.23520	652	18.25520	752	28.27520	852	37.09520	952	45.31520
553	15.29045	653	18.32045	753	28.35045	853	37.18045	953	45.41045
554	15.34580	654	18.38580	754	28.42580	854	37.26580	954	45.50580
555	15.40125	655	18.45125	755	28.50125	855	37.35125	955	45.60125
556	15.45680	656	18.51680	756	28.57680	856	37.43680	956	45.69680
557	15.51245	657	18.58245	757	28.65245	857	37.52245	957	45.79245
558	15.56820	658	18.64820	758	28.72820	858	37.60820	958	45.88820
559	15.62405	659	18.71405	759	28.80405	859	37.69405	959	45.98405
560	15.68000	660	18.78000	760	28.88000	860	37.78000	960	46.08000
561	15.73605	661	18.84605	761	28.95605	861	37.86605	961	46.17605
562	15.79220	662	18.91220	762	29.03220	862	37.95220	962	46.27220
563	15.84845	663	18.97845	763	29.10845	863	38.03845	963	46.36845
564	15.90480	664	19.04480	764	29.18480	864	38.12480	964	46.46480
565	15.96125	665	19.11125	765	29.26125	865	38.21125	965	46.56125
566	16.01780	666	19.17780	766	29.33780	866	38.29780	966	46.65780
567	16.07445	667	19.24445	767	29.41445	867	38.38445	967	46.75445
568	16.13120	668	19.31120	768	29.49120	868	38.47120	968	46.85120
569	16.18805	669	19.37805	769	29.56805	869	38.55805	969	46.94805
570	16.24500	670	19.44500	770	29.64500	870	38.64500	970	47.04500
571	16.30205	671	19.51205	771	29.72205	871	38.73205	971	47.14205
572	16.35920	672	19.57920	772	29.79920	872	38.81920	972	47.23920
573	16.41645	673	19.64645	773	29.87645	873	38.90645	973	47.33645
574	16.47380	674	19.71380	774	29.95380	874	38.99380	974	47.43380
575	16.53125	675	19.78125	775	30.03125	875	39.08125	975	47.53125
576	16.58880	676	19.84880	776	30.10880	876	39.16880	976	47.62880
577	16.64645	677	19.91645	777	30.18645	877	39.25645	977	47.72645
578	16.70420	678	19.98420	778	30.26420	878	39.34420	978	47.82420
579	16.76205	679	20.05205	779	30.34205	879	39.43205	979	47.92205
580	16.82000	680	20.12000	780	30.42000	880	39.52000	980	48.02000
581	16.87805	681	20.18805	781	30.49805	881	39.60805	981	48.11805
582	16.93620	682	20.25620	782	30.57620	882	39.69620	982	48.21620
583	16.99445	683	20.32445	783	30.65445	883	39.78445	983	48.31445
584	17.05280	684	20.39280	784	30.73280	884	39.87280	984	48.41280
585	17.11125	685	20.46125	785	30.81125	885	39.96125	985	48.51125
586	17.16980	686	20.52980	786	30.88980	886	40.04980	986	48.60980
587	17.22845	687	20.59845	787	30.96845	887	40.13845	987	48.70845
588	17.28720	688	20.66720	788	31.04720	888	40.22720	988	48.80720
589	17.34605	689	20.73605	789	31.12605	889	40.31605	989	48.90605
590	17.40500	690	20.80500	790	31.20500	890	40.40500	990	49.00500
591	17.46405	691	20.87405	791	31.28405	891	40.49405	991	49.10405
592	17.52320	692	20.94320	792	31.36320	892	40.58320	992	49.20320
593	17.58245	693	21.01245	793	31.44245	893	40.67245	993	49.30245
594	17.64180	694	21.08180	794	31.52180	894	40.76180	994	49.40180
595	17.70125	695	21.15125	795	31.60125	895	40.85125	995	49.50125
596	17.76080	696	21.22080	796	31.68080	896	40.94080	996	49.60080
597	17.82045	697	21.29045	797	31.76045	897	41.03045	997	49.70045
598	17.88020	698	21.36020	798	31.84020	898	41.12020	998	49.80020
599	17.94005	699	21.43005	799	31.92005	899	41.21005	999	49.90005
600	18.00000	700	21.50000	800	32.00000	900	41.30000	1000	50.00000

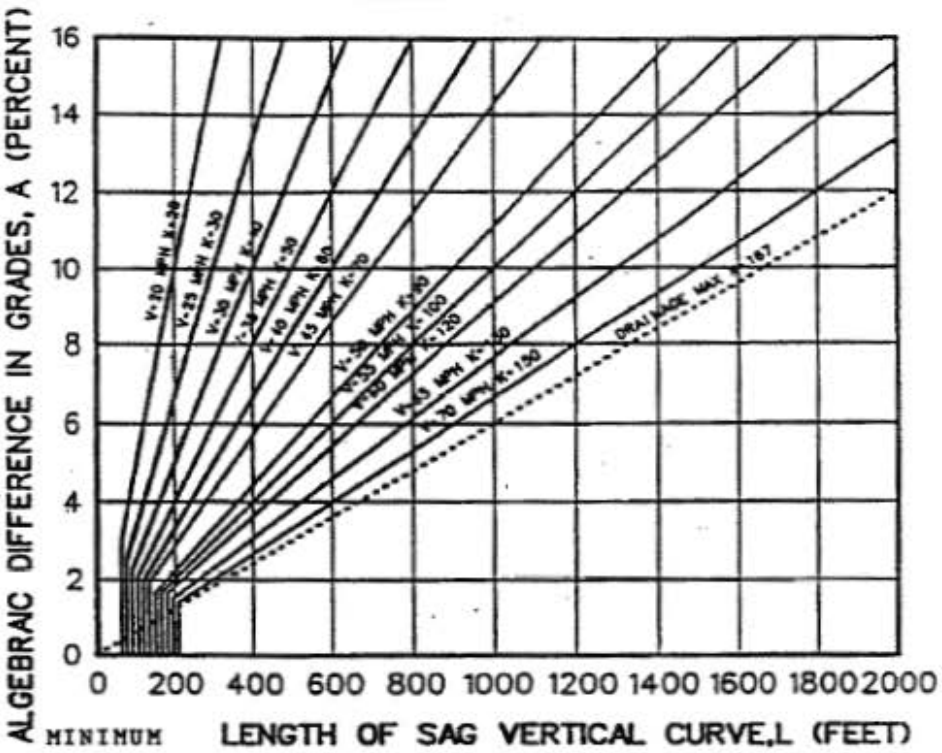
t in ft.	C	t in ft.	C	t in ft.	C	t in ft.	C	t in ft.	C
1001	30.10003	1101	40.61003	1201	71.12003	1301	84.61003	1401	98.14003
1002	30.20020	1102	40.72020	1202	72.24020	1302	84.74020	1402	98.28039
1003	30.30045	1103	40.83045	1203	72.36045	1303	84.89045	1403	98.42045
1004	30.40080	1104	40.94080	1204	72.48080	1304	85.02080	1404	98.56080
1005	30.50125	1105	41.05125	1205	72.60125	1305	85.15125	1405	98.70125
1006	30.60180	1106	41.16180	1206	72.72180	1306	85.28180	1406	98.84180
1007	30.70245	1107	41.27245	1207	72.84245	1307	85.41245	1407	98.98245
1008	30.80320	1108	41.38320	1208	72.96320	1308	85.54320	1408	99.12320
1009	30.90405	1109	41.49405	1209	73.08405	1309	85.67405	1409	99.26405
1010	31.00500	1110	41.60500	1210	73.20500	1310	85.80500	1410	99.40500
1011	31.10605	1111	41.71605	1211	73.32605	1311	85.93605	1411	99.54605
1012	31.20720	1112	41.82720	1212	73.44720	1312	86.06720	1412	99.68720
1013	31.30845	1113	41.93845	1213	73.56845	1313	86.19845	1413	99.82845
1014	31.40980	1114	42.04980	1214	73.68980	1314	86.32980	1414	99.96980
1015	31.51125	1115	42.16125	1215	73.81125	1315	86.46125	1415	100.11125
1016	31.61280	1116	42.27280	1216	73.93280	1316	86.59280	1416	100.25280
1017	31.71445	1117	42.38445	1217	74.05445	1317	86.72445	1417	100.39445
1018	31.81620	1118	42.49620	1218	74.17620	1318	86.85620	1418	100.53620
1019	31.91805	1119	42.60805	1219	74.29805	1319	86.98805	1419	100.67805
1020	32.02000	1120	42.72000	1220	74.42000	1320	87.12000	1420	100.82000
1021	32.12205	1121	42.83205	1221	74.54205	1321	87.25205	1421	100.96205
1022	32.22420	1122	42.94420	1222	74.66420	1322	87.38420	1422	101.10420
1023	32.32645	1123	43.05645	1223	74.78645	1323	87.51645	1423	101.24645
1024	32.42880	1124	43.16880	1224	74.90880	1324	87.64880	1424	101.38880
1025	32.53125	1125	43.28125	1225	75.03125	1325	87.78125	1425	101.53125
1026	32.63380	1126	43.39380	1226	75.15380	1326	87.91380	1426	101.67380
1027	32.73645	1127	43.50645	1227	75.27645	1327	88.04645	1427	101.81645
1028	32.83920	1128	43.61920	1228	75.39920	1328	88.17920	1428	101.95920
1029	32.94205	1129	43.73205	1229	75.52205	1329	88.31205	1429	102.10205
1030	33.04500	1130	43.84500	1230	75.64500	1330	88.44500	1430	102.24500
1031	33.14805	1131	43.95805	1231	75.76805	1331	88.57805	1431	102.38805
1032	33.25120	1132	44.07120	1232	75.89120	1332	88.71120	1432	102.53120
1033	33.35445	1133	44.18445	1233	76.01445	1333	88.84445	1433	102.67445
1034	33.45780	1134	44.29780	1234	76.13780	1334	88.97780	1434	102.81780
1035	33.56125	1135	44.41125	1235	76.26125	1335	89.11125	1435	102.96125
1036	33.66480	1136	44.52480	1236	76.38480	1336	89.24480	1436	103.10480
1037	33.76845	1137	44.63845	1237	76.50845	1337	89.37845	1437	103.24845
1038	33.87220	1138	44.75220	1238	76.63220	1338	89.51220	1438	103.39220
1039	33.97605	1139	44.86605	1239	76.75605	1339	89.64605	1439	103.53605
1040	34.08000	1140	44.98000	1240	76.88000	1340	89.78000	1440	103.68000
1041	34.18405	1141	45.09405	1241	77.00405	1341	89.91405	1441	103.82405
1042	34.28820	1142	45.20820	1242	77.12820	1342	90.04820	1442	103.96820
1043	34.39245	1143	45.32245	1243	77.25245	1343	90.18245	1443	104.11245
1044	34.49680	1144	45.43680	1244	77.37680	1344	90.31680	1444	104.25680
1045	34.60125	1145	45.55125	1245	77.50125	1345	90.45125	1445	104.40125
1046	34.70580	1146	45.66580	1246	77.62580	1346	90.58580	1446	104.54580
1047	34.81045	1147	45.78045	1247	77.75045	1347	90.72045	1447	104.69045
1048	34.91520	1148	45.89520	1248	77.87520	1348	90.85520	1448	104.83520
1049	35.02005	1149	46.01005	1249	78.00005	1349	90.98005	1449	104.98005
1050	35.12500	1150	46.12500	1250	78.12500	1350	91.12500	1450	105.12500
1051	35.23005	1151	46.24005	1251	78.25005	1351	91.26005	1451	105.27005
1052	35.33520	1152	46.35520	1252	78.37520	1352	91.39520	1452	105.41520
1053	35.44045	1153	46.47045	1253	78.50045	1353	91.53045	1453	105.56045
1054	35.54580	1154	46.58580	1254	78.62580	1354	91.66580	1454	105.70580
1055	35.65125	1155	46.70125	1255	78.75125	1355	91.80125	1455	105.85125
1056	35.75680	1156	46.81680	1256	78.87680	1356	91.93680	1456	105.99680
1057	35.86245	1157	46.93245	1257	79.00245	1357	92.07245	1457	106.14245
1058	35.96820	1158	47.04820	1258	79.12820	1358	92.20820	1458	106.28820
1059	36.07405	1159	47.16405	1259	79.25405	1359	92.34405	1459	106.43405
1060	36.18000	1160	47.28000	1260	79.38000	1360	92.48000	1460	106.58000
1061	36.28605	1161	47.39605	1261	79.50605	1361	92.61605	1461	106.72605
1062	36.39220	1162	47.51220	1262	79.63220	1362	92.75220	1462	106.87220
1063	36.49845	1163	47.62845	1263	79.75845	1363	92.88845	1463	107.01845
1064	36.60480	1164	47.74480	1264	79.88480	1364	93.02480	1464	107.16480
1065	36.71125	1165	47.86125	1265	80.01125	1365	93.16125	1465	107.31125
1066	36.81780	1166	47.97780	1266	80.13780	1366	93.29780	1466	107.45780
1067	36.92445	1167	48.09445	1267	80.26445	1367	93.43445	1467	107.60445
1068	37.03120	1168	48.21120	1268	80.39120	1368	93.57120	1468	107.75120
1069	37.13805	1169	48.32805	1269	80.51805	1369	93.70805	1469	107.89805
1070	37.24500	1170	48.44500	1270	80.64500	1370	93.84500	1470	108.04500
1071	37.35205	1171	48.56205	1271	80.77205	1371	93.98205	1471	108.19205
1072	37.45920	1172	48.67920	1272	80.89920	1372	94.11920	1472	108.33920
1073	37.56645	1173	48.79645	1273	81.02645	1373	94.25645	1473	108.48645
1074	37.67380	1174	48.91380	1274	81.15380	1374	94.39380	1474	108.63380
1075	37.78125	1175	49.03125	1275	81.28125	1375	94.53125	1475	108.78125
1076	37.88880	1176	49.14880	1276	81.40880	1376	94.66880	1476	108.92880
1077	37.99645	1177	49.26645	1277	81.53645	1377	94.80645	1477	109.07645
1078	38.10420	1178	49.38420	1278	81.66420	1378	94.94420	1478	109.22420
1079	38.21205	1179	49.50205	1279	81.79205	1379	95.08205	1479	109.37205
1080	38.32000	1180	49.62000	1280	81.92000	1380	95.22000	1480	109.52000
1081	38.42805	1181	49.73805	1281	82.04805	1381	95.35805	1481	109.66805
1082	38.53620	1182	49.85620	1282	82.17620	1382	95.49620	1482	109.81620
1083	38.64445	1183	49.97445	1283	82.30445	1383	95.63445	1483	109.96445
1084	38.75280	1184	50.09280	1284	82.43280	1384	95.77280	1484	110.11280
1085	38.86125	1185	50.21125	1285	82.56125	1385	95.91125	1485	110.26125
1086	38.96980	1186	50.32980	1286	82.68980	1386	96.04980	1486	110.40980
1087	39.07845	1187	50.44845	1287	82.81845	1387	96.18845	1487	110.55845
1088	39.18720	1188	50.56720	1288	82.94720	1388	96.32720	1488	110.70720
1089	39.29605	1189	50.68605	1289	83.07605	1389	96.46605	1489	110.85605
1090	39.40500	1190	50.80500	1290	83.20500	1390	96.60500	1490	111.00500
1091	39.51405	1191	50.92405	1291	83.33405	1391	96.74405	1491	111.15405
1092	39.62320	1192	51.04320	1292	83.46320	1392	96.88320	1492	111.30320
1093	39.73245	1193	51.16245	1293	83.59245	1393	97.02245	1493	111.45245
1094	39.84180	1194	51.28180	1294	83.72180	1394	97.16180	1494	111.60180
1095	39.95125	1195	51.40125	1295	83.85125	1395	97.30125	1495	111.75125
1096	40.06080	1196	51.52080	1296	83.98080	1396	97.44080	1496	111.90080
1097	40.17045	1197	51.64045	1297	84.11045	1397	97.58045	1497	112.05045
1098	40.28020	1198	51.76020	1298	84.24020	1398	97.72020	1498	112.20020
1099	40.39005	1199	51.88005	1299	84.37005	1399	97.86005	1499	112.35005
1100	40.50000	1200	52.00000	1300	84.50000	1400	98.00000	1500	112.50000

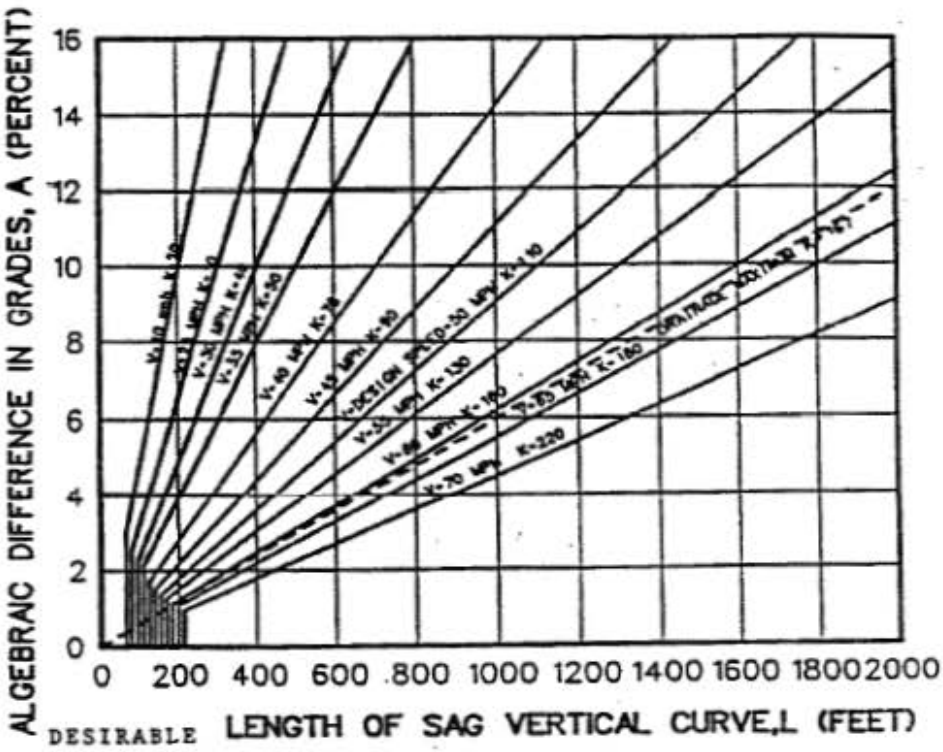
5. LENGTH OF CREST VERTICAL CURVES





6. LENGTH OF SAG VERTICAL CURVES





PIN NO. 23651

FED. ROAD DIV. NO.	STATE	COUNTY	FILE NO.		ROAD NO.	SHEET NO.	
3	S.C.	CHESTERFIELD			S-113	15	

PLAN — SURVEYED / DRAWN / ALIGNMENT CHECKED / R/ OF WAY CHECKED / NOTE BOOK / No. — DATE / BY

N

140

(29) ANNIE W EUSTLER

145

150

NEW 33' R /W

29C 36C 34C 32C 24C 24C

PC 144+54.19

11' 11' N 89° 45' 22" E 11' 11'

NEW 46' R /W 39C

NEW 70' R /W 53

RETAIN 72-24" RC PIPE
ADD 20-24" RC PIPE

RETAIN 69-18" RC PIPE

PT 146+68.22

NEW 33' R /W

16F 18F 21F 22F 17F 18F 19F

N 54° 15' 12" E

40' R

NEW 69' R /W

TIE EQUALITY
P.O.T. STA. 147+00.00 ROAD S-113 =
P.I. STA. 10+00.00 OUTFALL TRAVERSE 7

SURVEY STA.151+98.14 END
FILE 23. ROAD S-113

LEFT SIDE
143+41-26.5' WDS.
143+61-33.3' P.O.B.
143+73-33.6' P.O.B.
144+08-33.3' W.M.P.
144+39-38.3' W.M.P.
144+70-38.3' G. WIRE
145+73-33.6' P.O.B.

RIGHT SIDE
140+46-17.6' I. PIN
141+72-18.1' I. PIN
141+72-25.8' 18" OAK
141+80-25.8' TREE
142+03-25.8' LINE
142+33-25.8' CORN.
142+33-6.4' LINE
142+33-1.7' CORN.
142+33-0.3' PROP. LINE
142+33-0.3' PROP. CORN.
142+33-0.3' I. PIN
142+33-0.3' I. PIN
142+33-0.3' I. PIN

Plan Preparation Guide

Chapter 9

Drainage Structures – R.C. Box Culverts – Ditches - Gutters - Curbs

1. **Plans For Hydrology**

Submit to Hydrology all plans (including 'C') that have ditches with slopes greater than 3%.

Printouts of existing drainage elevations, outfall ditches and any other pertinent information will be supplied by SCDOT Road Design Section as needed.

The "view only" access will be provided by the Hydraulic Engineering Office in order to share files over the network. Design Groups will copy necessary files to the ftp server for on-call consultants.

Consultants should add new pipe, drainage structures, outfall ditches, and notes to plan sheets in red and new NPDES items and text in green. Department personnel will place those new additions onto the original plans upon return to Road Design.

Drainage design and NPDES can be shown on the same plan sheet. If sheets become cluttered, this can be reviewed on a per case basis.

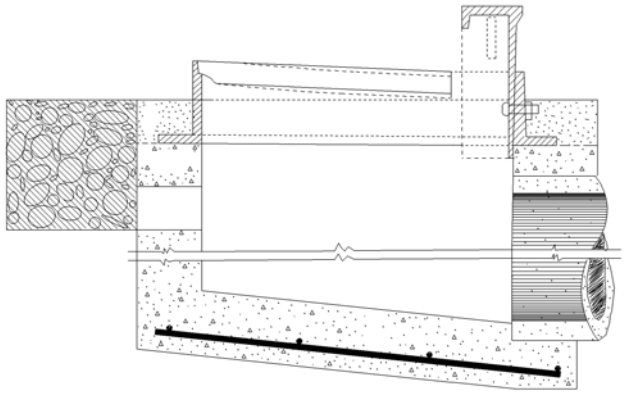
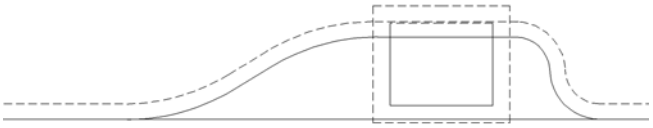
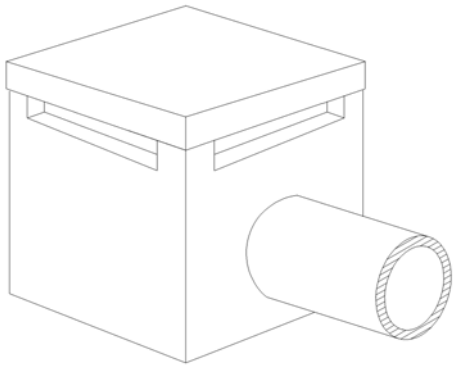
New drainage shall be included in the design file. Road Design will merge the hydrology information into their original design file.

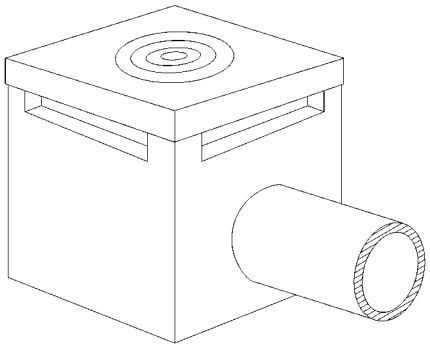
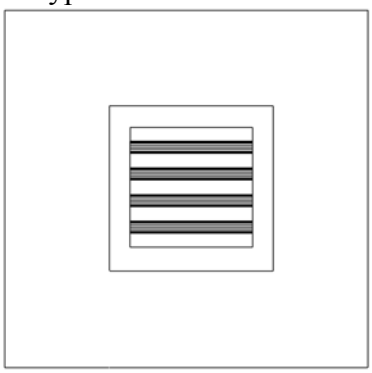
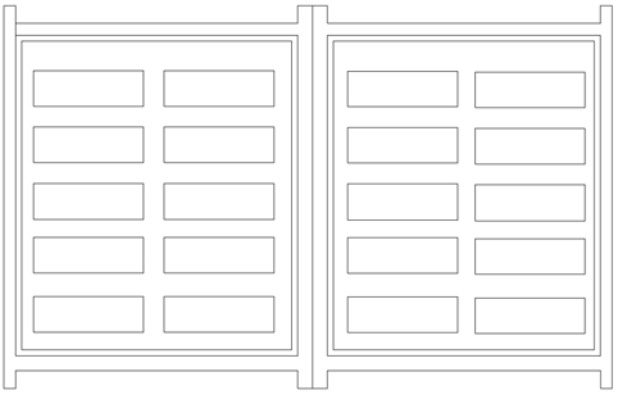
Design information for pipes and drainage boxes will be stored in a '.gdf' file created by the Hydraulic Engineering Office or on-call consultants. Road Design will use GEOPAK Drainage tools to automate the drafting. The current process of merging graphics will be eliminated.

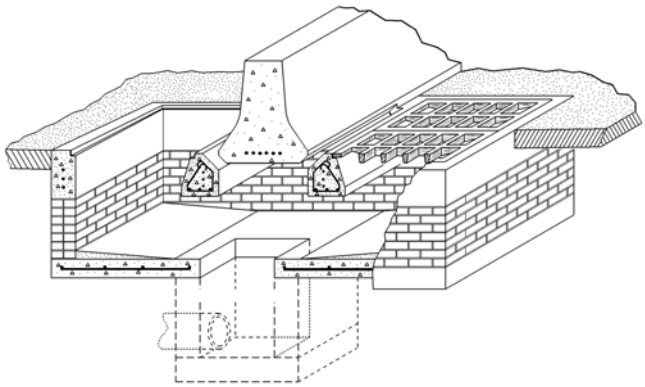
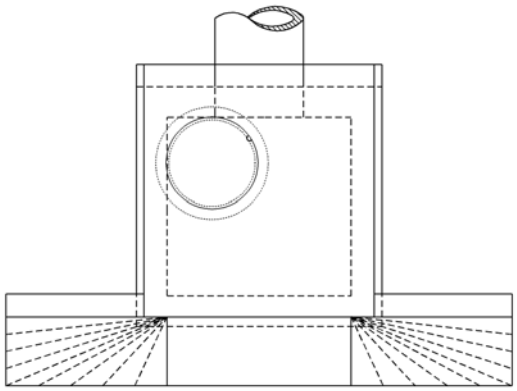
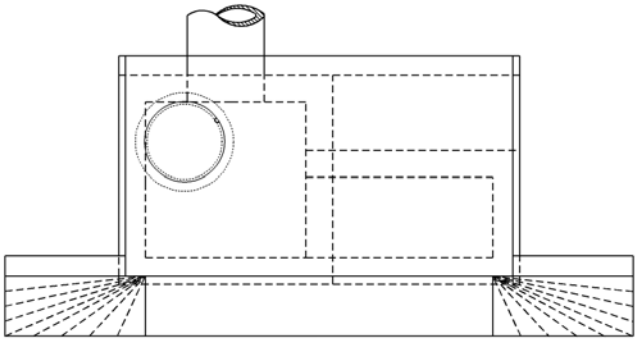
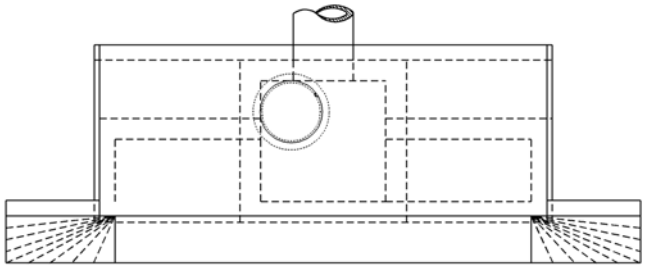
Pipe lengths will be automatically calculated along the pipe slope from center of box to center of box. The individual pipe length will be accurate to the nearest foot. The total pipe quantity will be rounded up to the nearest length divisible by four.

Drainage design changes can be made by the road designer as directed in Instructional Bulletin 98-10. Drainage notes can be updated automatically for most of the design changes. In lieu of using MicroStation, both the Hydraulic Engineering Office and Road Design must use GEOPAK Drainage to make all drainage design changes.

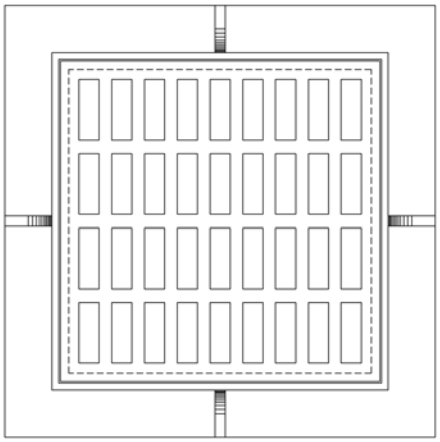
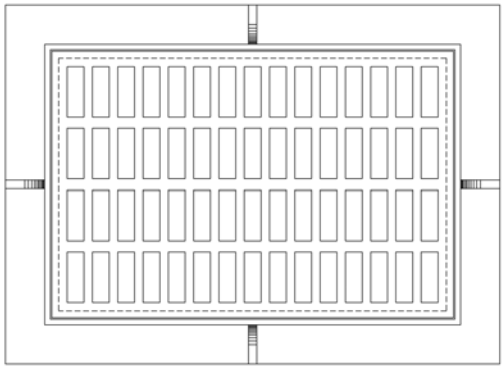
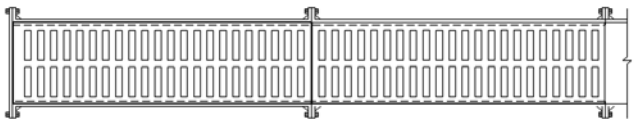
2. Catch Basin Types & Uses

Catch Basin	Uses
Catch Basin Type 1 	With Catch Basin Type 1 (Special) Concrete Medians Curbed grass medians On Curb and Gutter where it does not protrude into the travel lane Standard Drawing 719-1
Catch Basin Type 1 (Special)  See Catch Basin Type1 For Detail of Basin	Concrete Medians Curbed Grass Medians Standard Drawing 719-2
Catch Basin Type 9 	In Ditches Outside of the Clear Zone In Low Areas Outside of the Clear Zone Standard Drawing 719-3

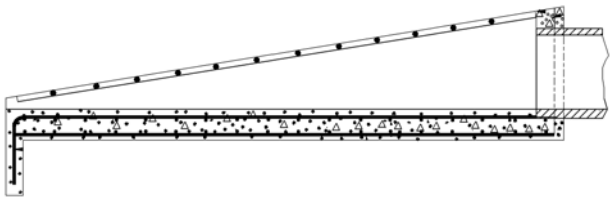
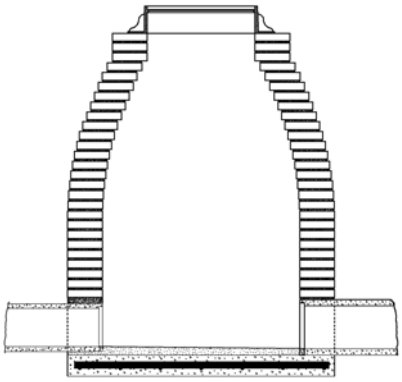
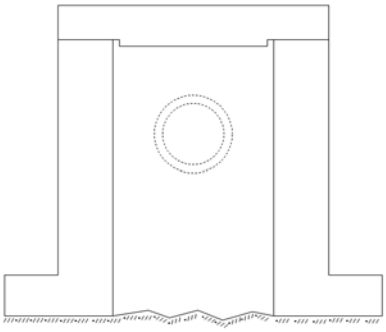
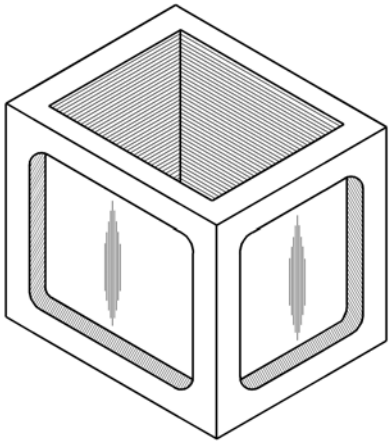
Catch Basin	Uses
Catch Basin Type 9-MH 	Same as Catch Basin Type 9 with Manhole added for access Standard Drawing 719-4
Catch Basin Type 12  See Catch Basin Type1 For Detail of Basin	Median ditches on dual lane roadways w/earth median Side ditches on controlled access highway Low areas on controlled access highways where there should be no pedestrian traffic Standard Drawing 719-6
Catch Basin Type 14 	In ditches, valleys or low areas where pedestrian traffic is unlikely Not to be used in the path of vehicular traffic Standard Drawing 719-8

Catch Basin	Uses
Catch Basin Type 15 	In paved medians with concrete median barrier May be a single basin or double basin Standard Drawing 719-9
Catch Basin Type 16 	On curb and gutter roadways On valley gutter sections with the face of catch basin at the back of paved lip NOTE: Deduct 10' from curb and gutter length. Standard Drawing 719-18
Catch Basin Type 17 	On curb and gutter roadways On valley gutter sections with the face of catch basin at the back of paved lip NOTE: Deduct 14' from curb and gutter length. Standard Drawing 719-19
Catch Basin Type 18 	In low point on curb and gutter roadway In low point on valley gutter sections with face of catch basin at the back of paved lip NOTE: Deduct 18' from curb and gutter length. Standard Drawing 719-20

3. Drop Inlet Types & Uses

Drop Inlet	Uses
Drop Inlet (24” x 24”) 	Yard Drains Standard Drawing 719-10
Drop Inlet (24” x 36”) 	Yard Drains Paved and earth valleys Low areas where pedestrian traffic is likely Also Standard Drawing 719-10
Drop Inlet (Multiple Grate) 	In driveways and parking lots where water is to be intercepted over a wide area Standard Drawing 719-11

4. Pipe End Structure & Uses

Pipe End Structure	Uses
Pipe End Structure 	Pipe ends facing traffic within the clear zone Standard Drawing 719-15
Manhole 	For access to pipe for maintenance Standard Drawing 719-3
Springbox 	For drainage of underground springs within roadway Standard Drawing 719-14
Precast Concrete Drainage Box 	For use when normal boxes are not acceptable Standard Drawing 719-17

5. Catch Basin Spacing for Types 16, 17, & 18 Catch Basin

CATCH BASIN TYPE 16 - Standard curb type basin, 4' inlet opening.

CATCH BASIN TYPE 17 - Expanded curb type basin, 8' inlet opening. May be used when the volume of water exceeds the capacity for Catch Basin Type 16.

CATCH BASIN TYPE 18 - Curb type basin, 8' inlet opening. Used primarily for low points.

INSTRUCTIONS FOR USE OF THE SPACING TABLES

A. Find the correct region from the outline map.

B. Select the correct chart for the Catch Basin Type and pavement cross slope.

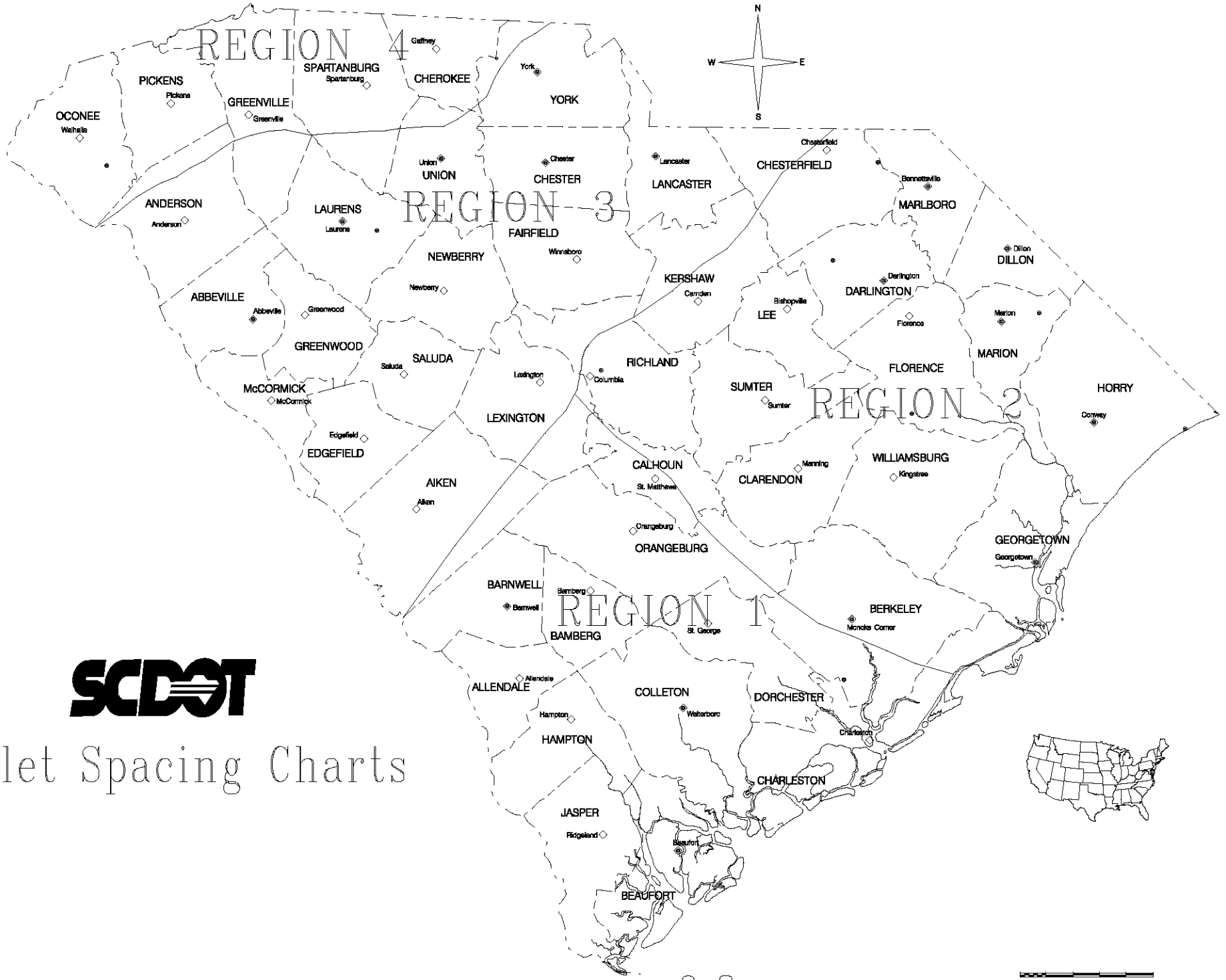
C. Find the proper road grade along the bottom of the chart and place a vertical line to intersect with the correct drainage profile. Use the inset if the grade is less than one (1) percent.

D. Place a horizontal line from the vertical intersection to the left column and read the drainage area.

E. Divide the drainage area by the width of roadway draining to the gutter. Do not forget to include the sidewalk area. This figure is the spacing between catch basin.

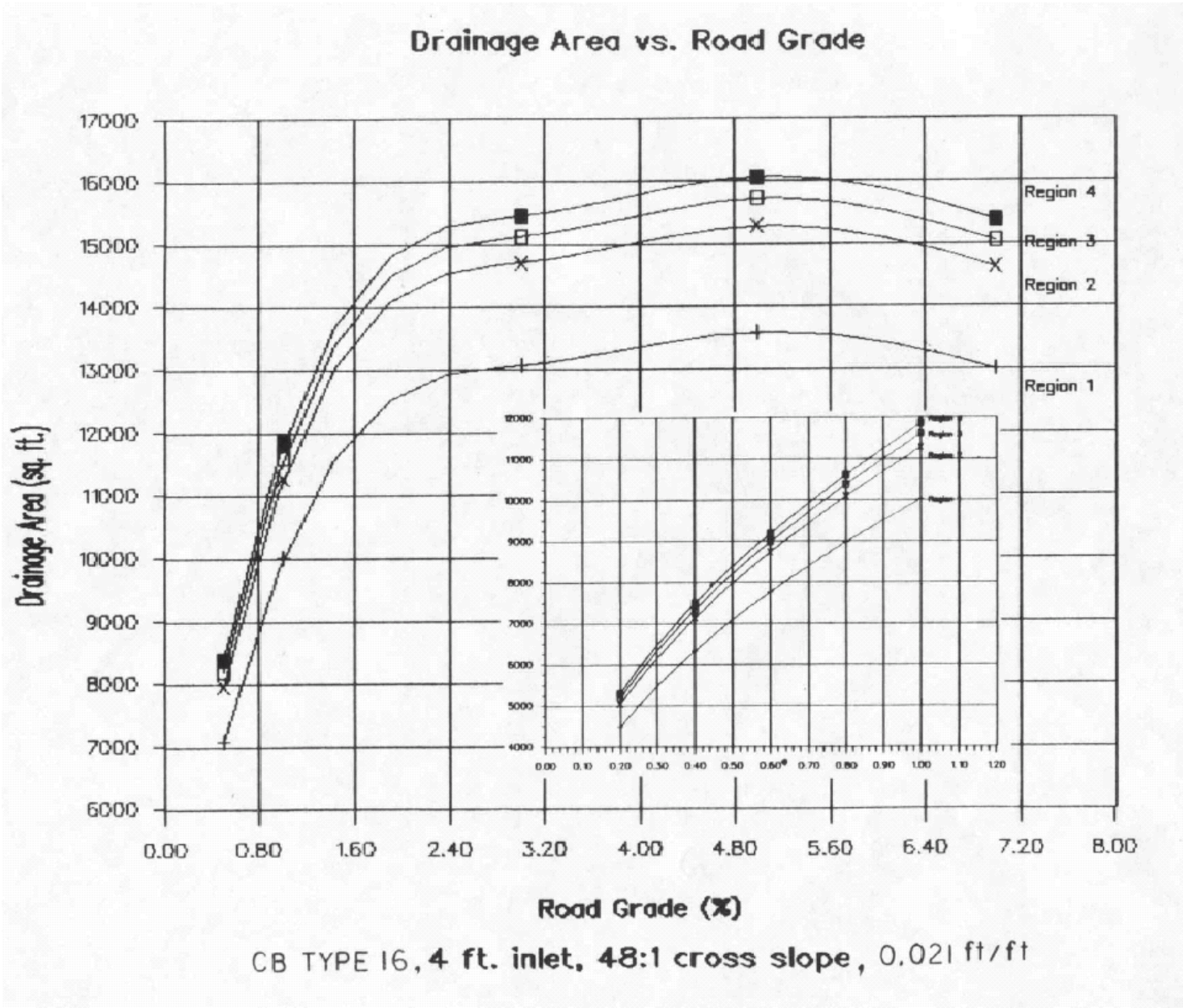
NOTE: MINIMUM BASIN SPACING - 150 LF
MAXIMUM BASIN SPACING - 400 LF

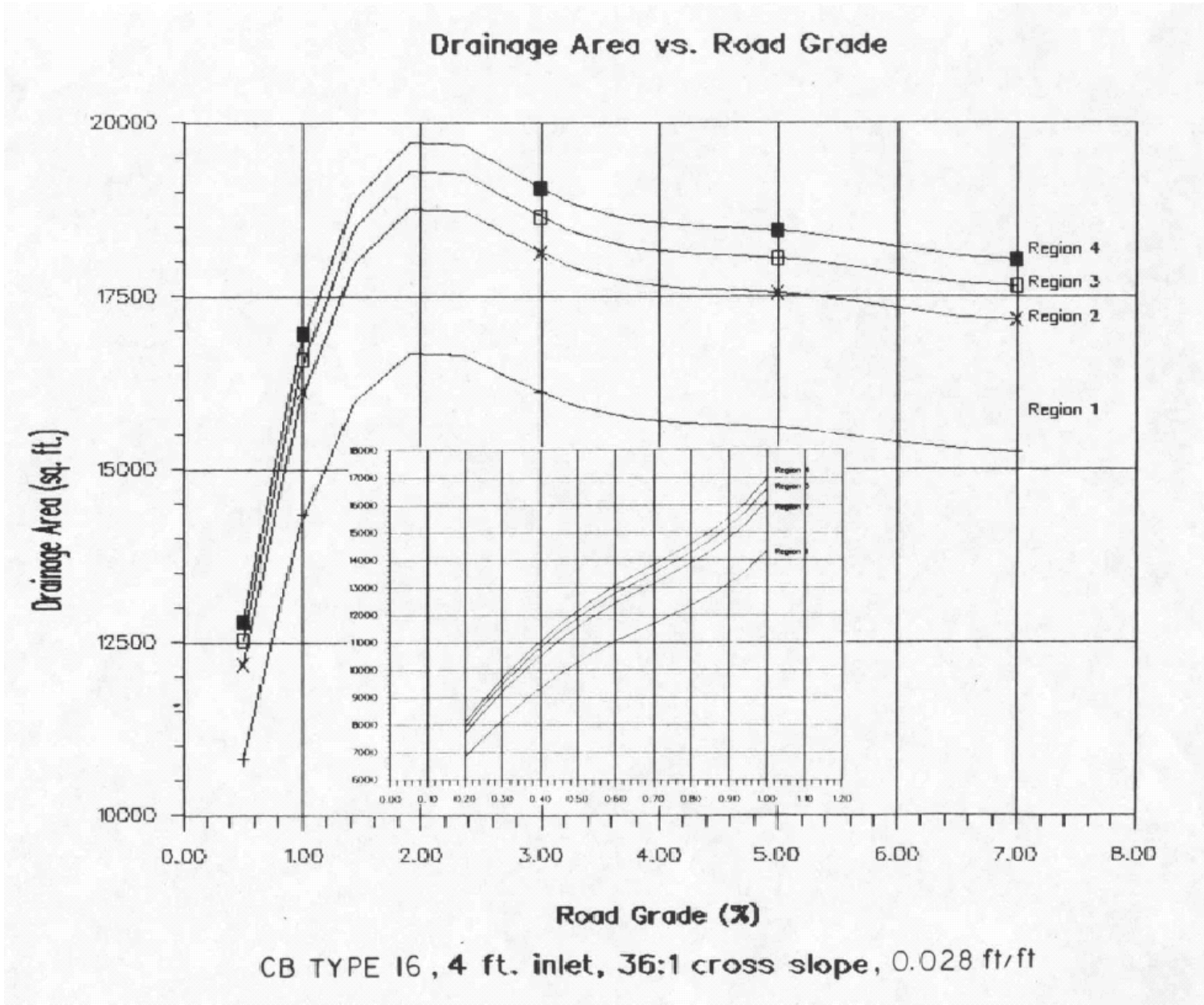
Examples of computing catch basin spacing follow the spacing charts.

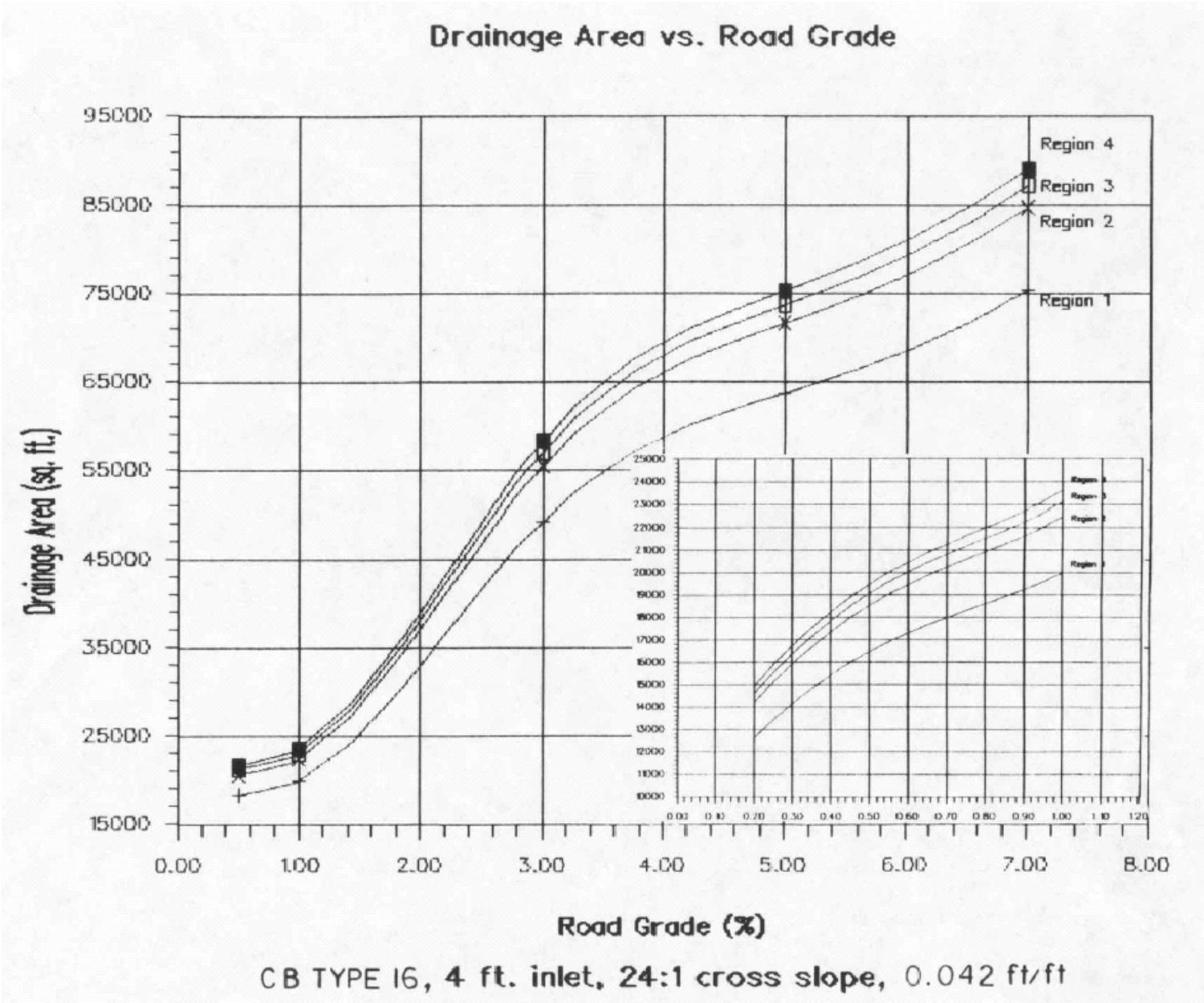


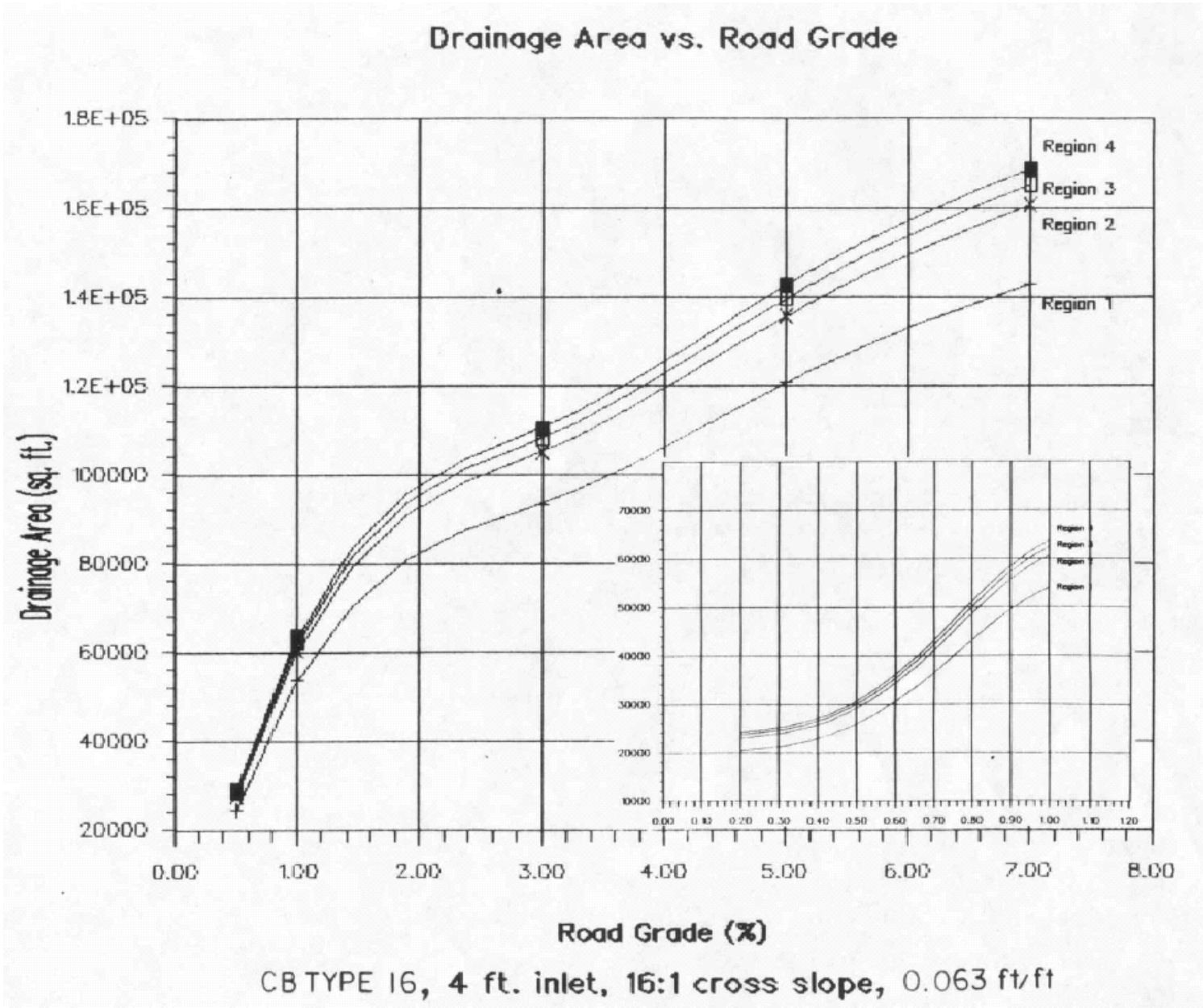
SCDOT

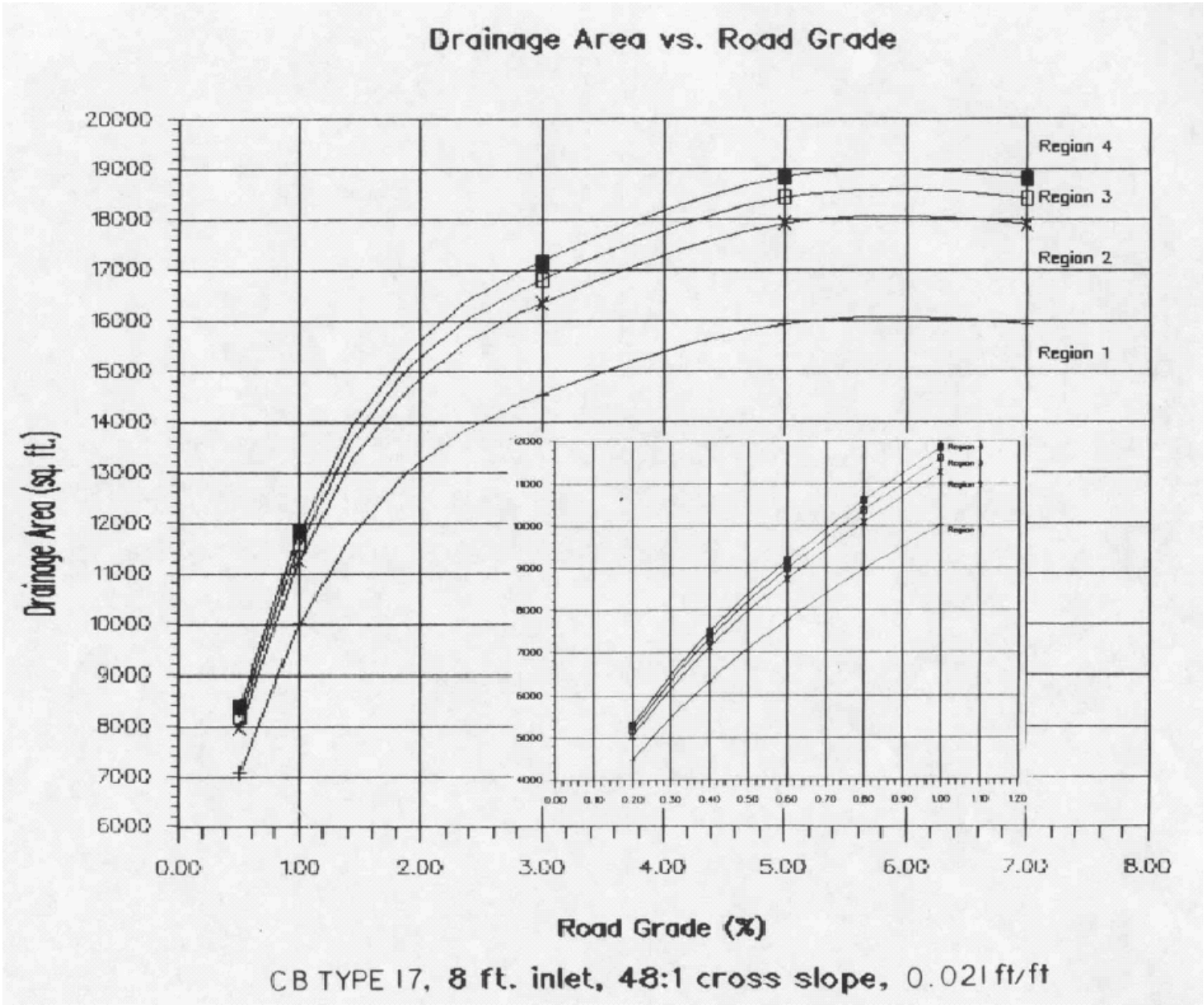
Inlet Spacing Charts

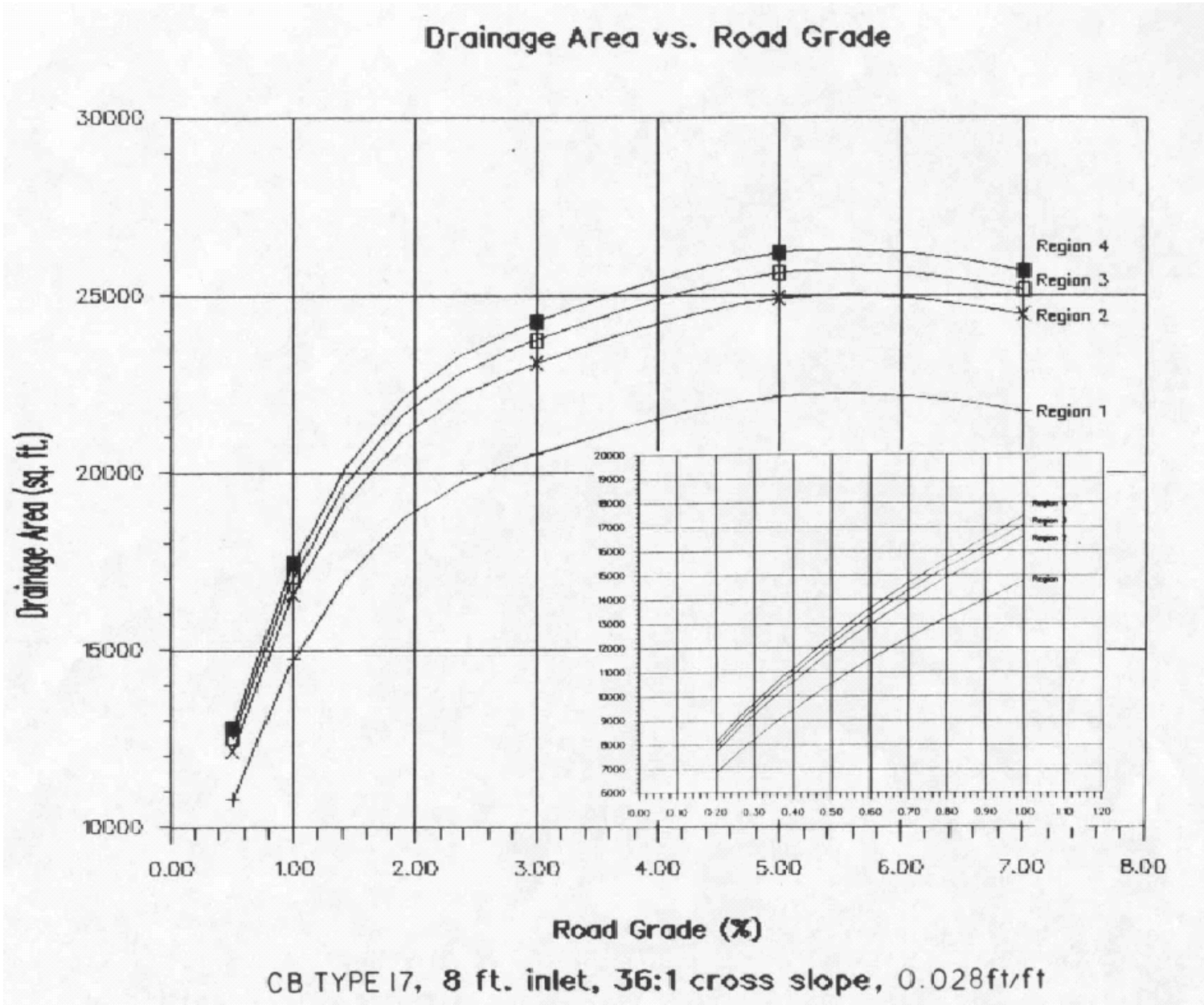

Drainage Area vs. Road Grade
Drainage Area (sq. ft.)
17000
16000
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
0.00
0.80
1.60
2.40
3.20
4.00
4.80
5.60
6.40
7.20
8.00
Road Grade (%)
Region 4
Region 3
Region 2
Region 1
CB TYPE 16, 4 ft. inlet, 48:1 cross slope, 0.021 ft/ft

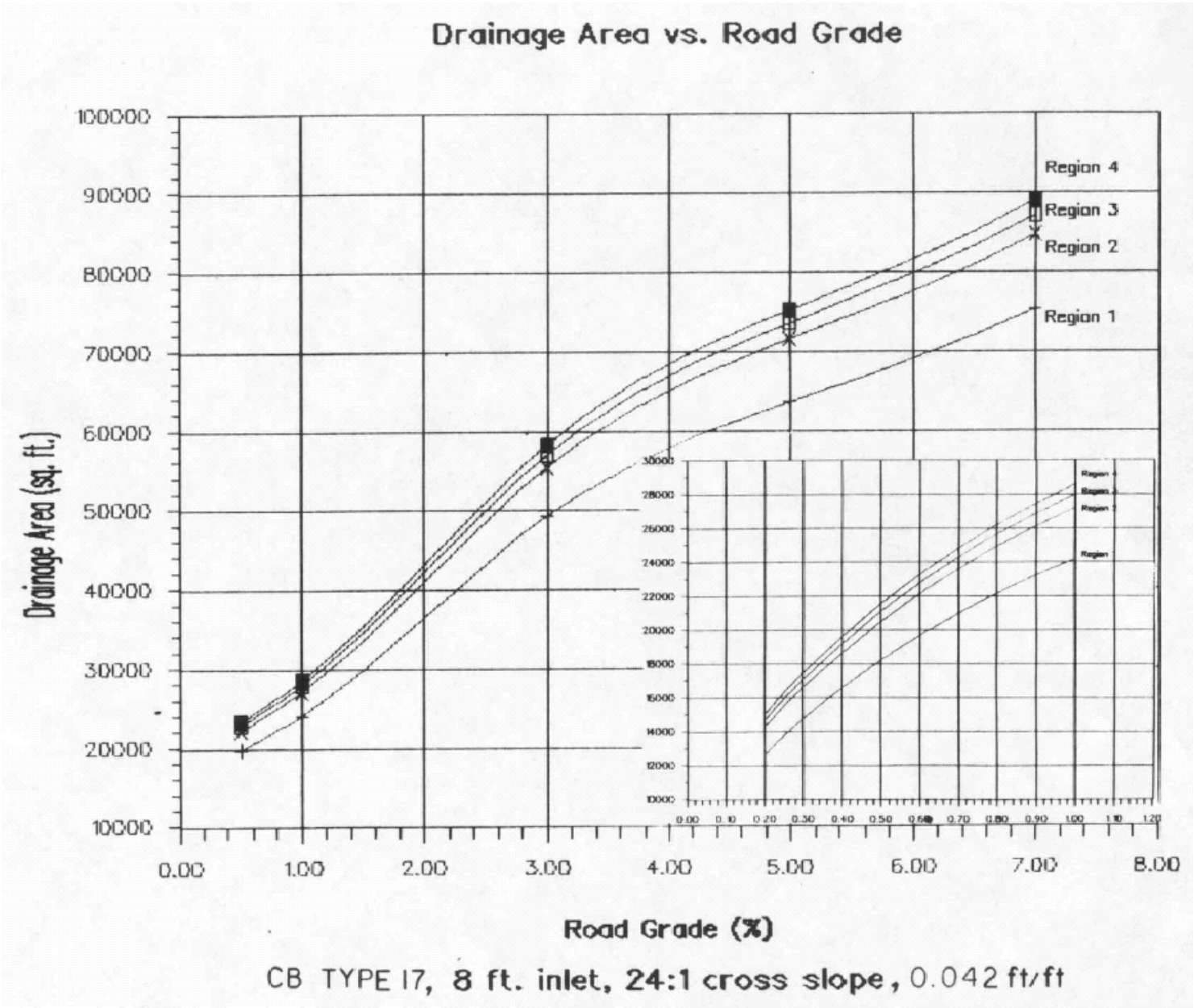

Drainage Area vs. Road Grade
20000
17500
15000
12500
10000
Drainage Area (sq. ft.)
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
Road Grade (%)
Region 4
Region 3
Region 2
Region 1
CB TYPE 16 , 4 ft. inlet, 36:1 cross slope, 0.028 ft/ft

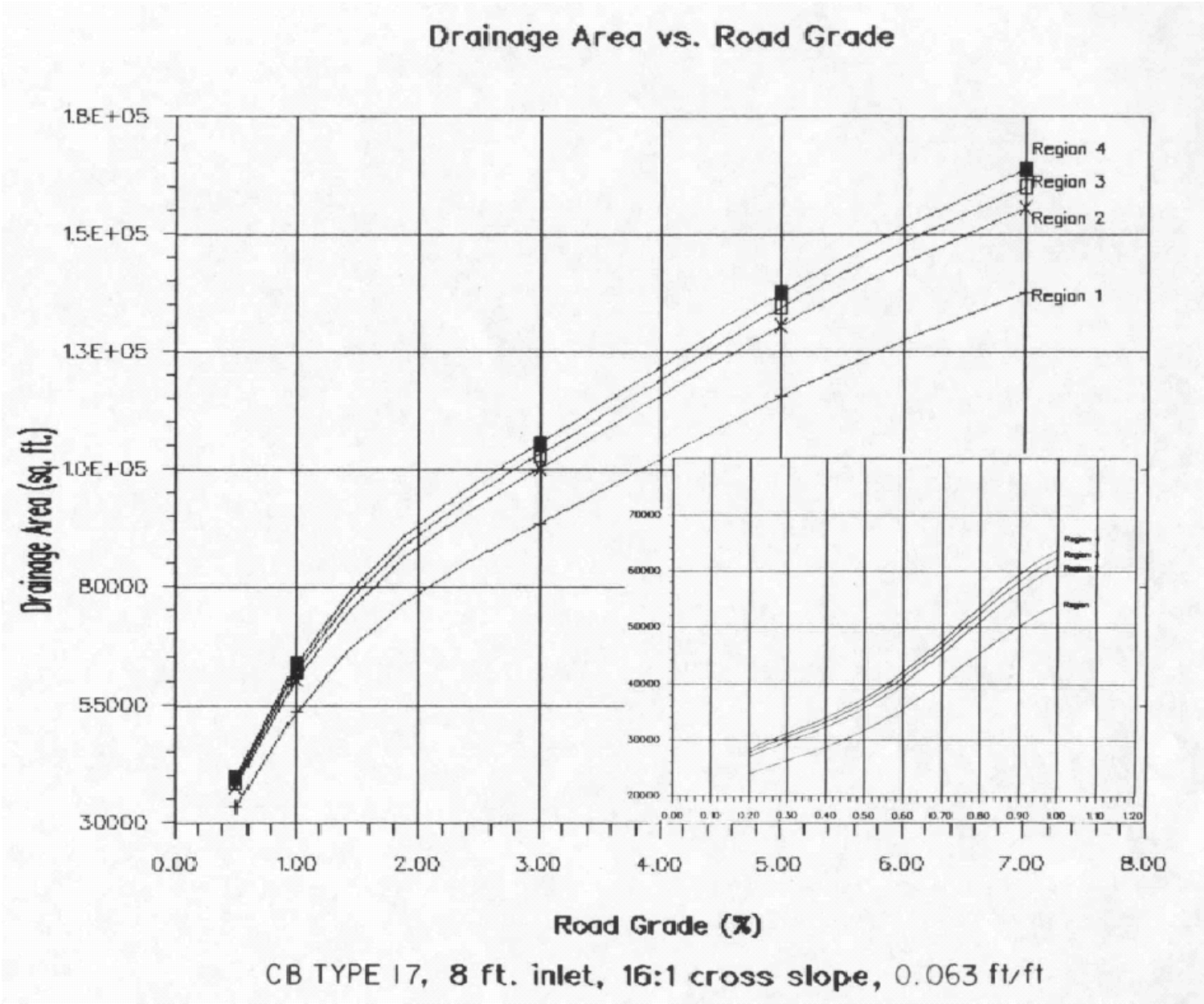

Drainage Area vs. Road Grade
Drainage Area (sq. ft.)
95000
85000
75000
65000
55000
45000
35000
25000
15000
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
Region 4
Region 3
Region 2
Region 1
Road Grade (%)
CB TYPE 16, 4 ft. inlet, 24:1 cross slope, 0.042 ft/ft

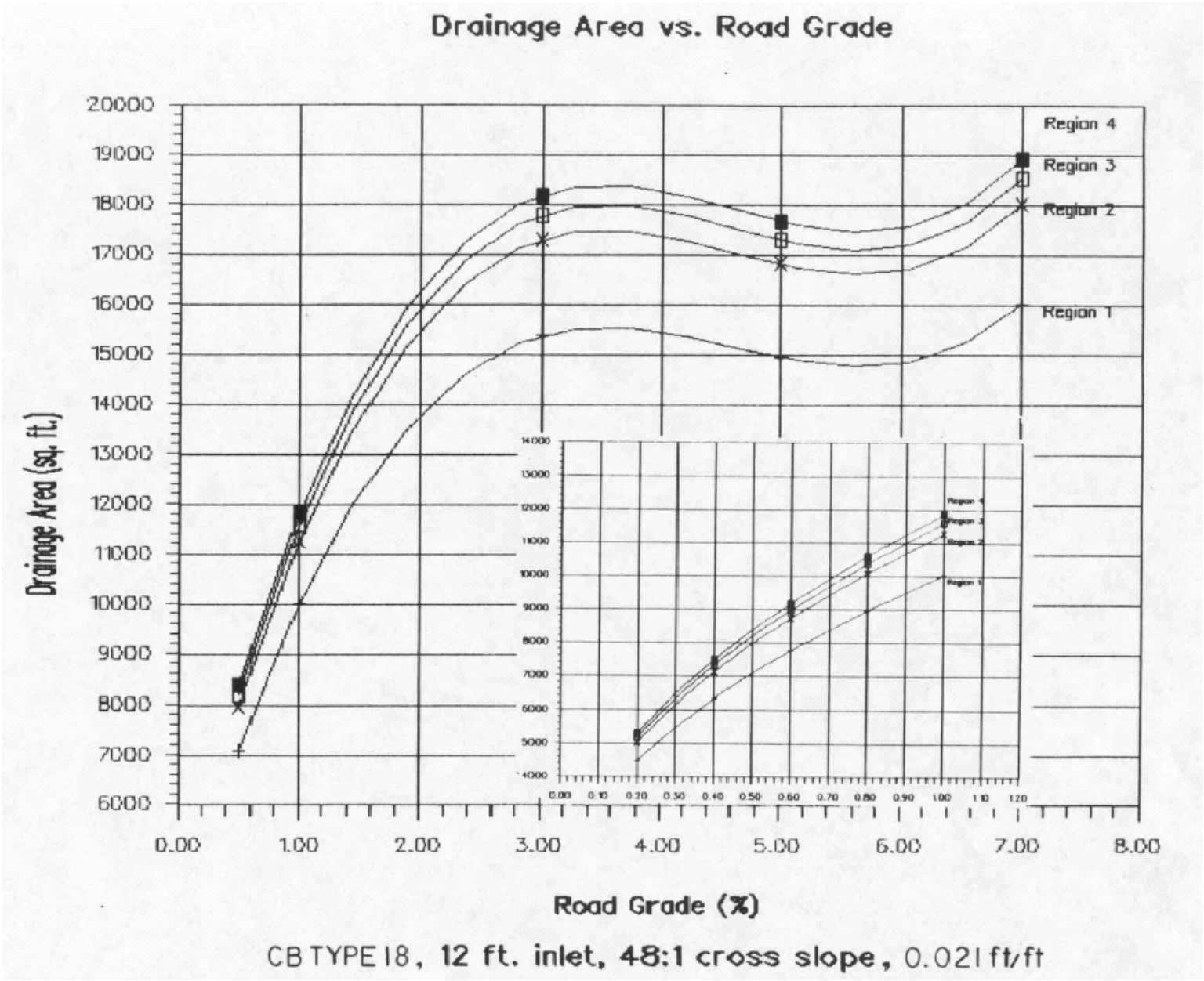

Drainage Area vs. Road Grade
Drainage Area (sq. ft.)
1.8E+05
1.6E+05
1.4E+05
1.2E+05
100000
80000
60000
40000
20000
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
Region 4
Region 3
Region 2
Region 1
Road Grade (%)
CB TYPE 16, 4 ft. inlet, 16:1 cross slope, 0.063 ft/ft

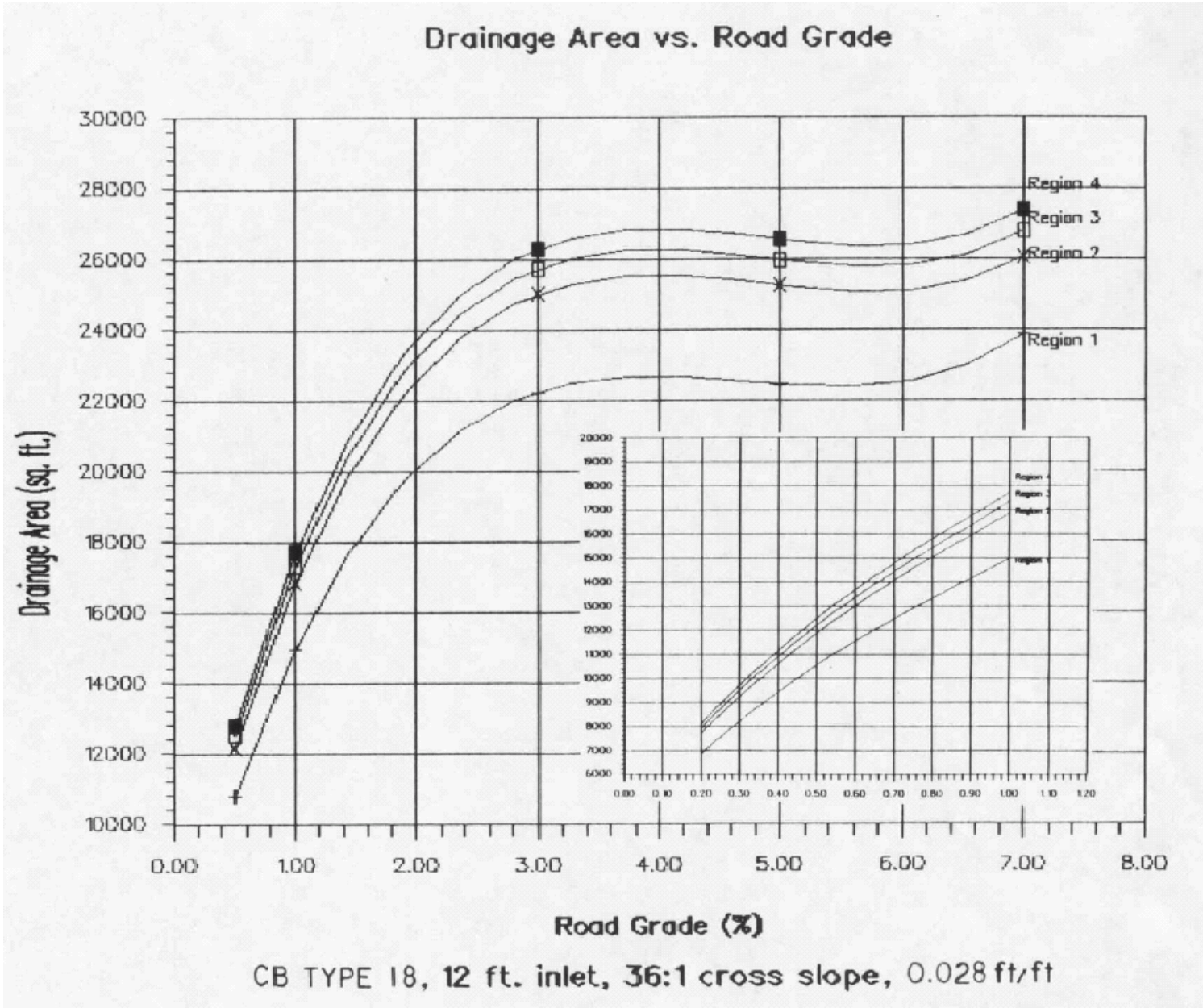

Drainage Area vs. Road Grade
Drainage Area (sq. ft.)
20000
19000
18000
17000
16000
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
Region 4
Region 3
Region 2
Region 1
Road Grade (%)
CB TYPE 17, 8 ft. inlet, 48:1 cross slope, 0.021 ft/ft

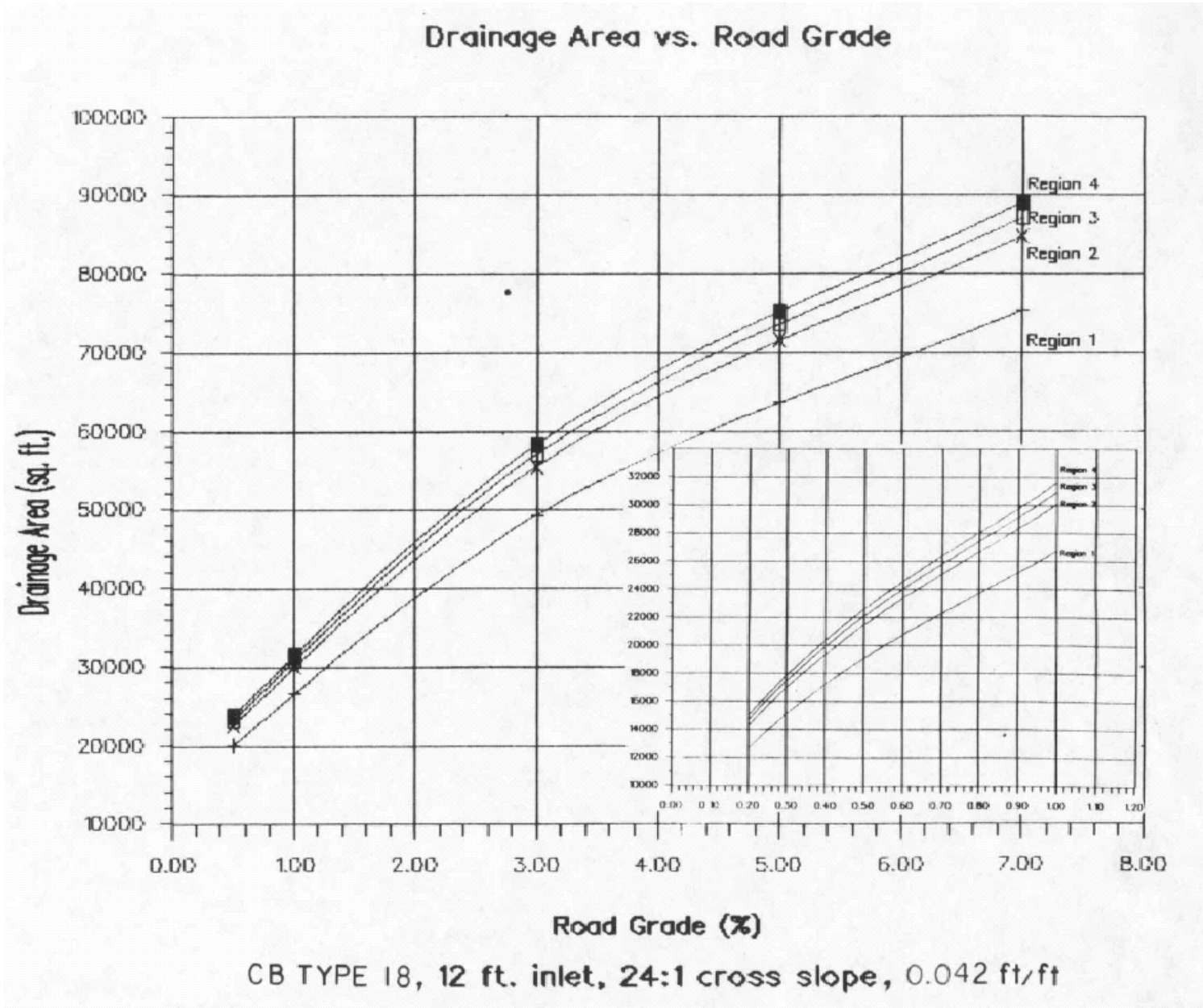

Drainage Area vs. Road Grade
Drainage Area (sq. ft.)
30000
25000
20000
15000
10000
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
Road Grade (%)
Region 4
Region 3
Region 2
Region 1
CB TYPE 17, 8 ft. inlet, 36:1 cross slope, 0.028ft/ft

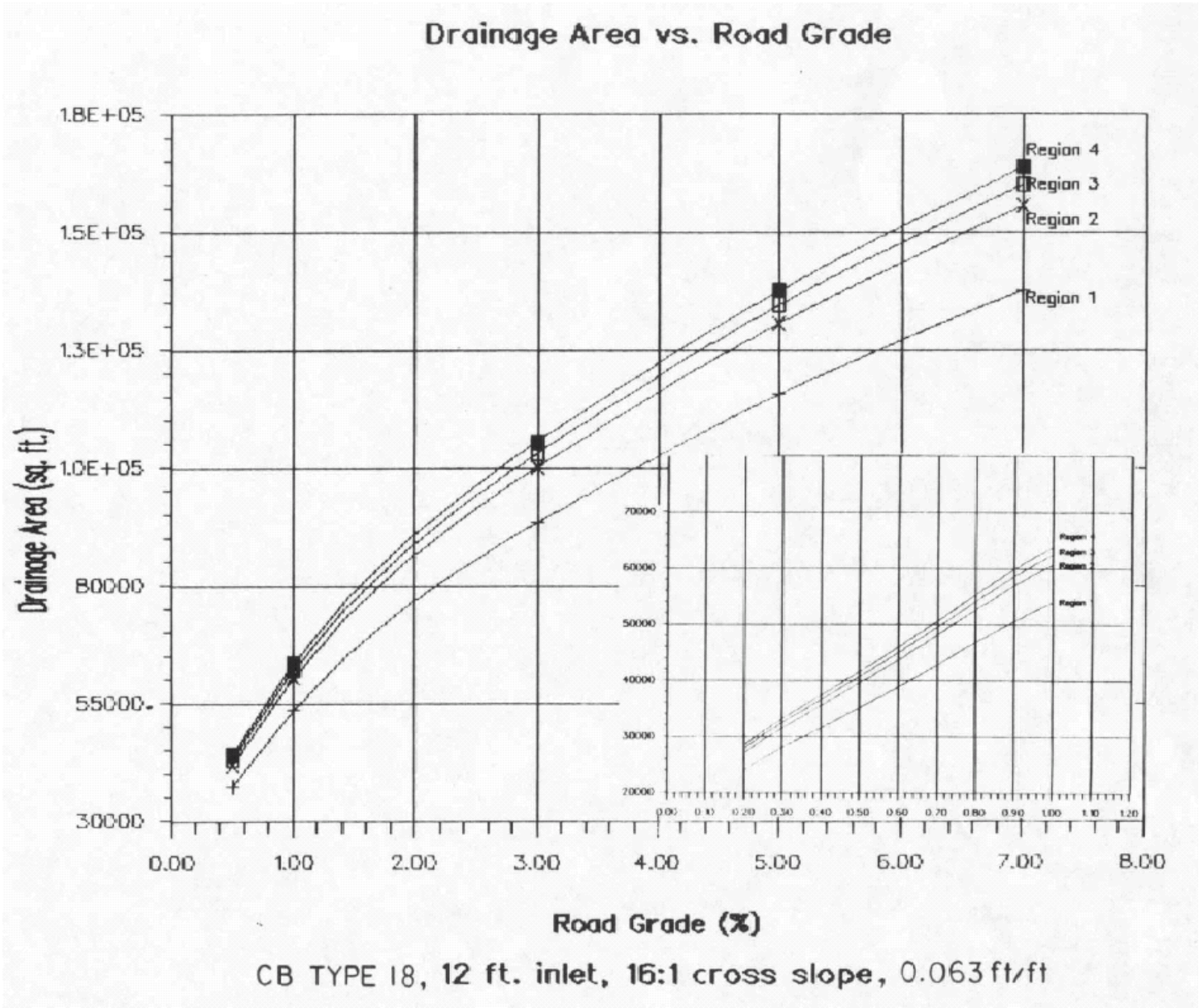

Drainage Area vs. Road Grade
Drainage Area (sq. ft.)
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
Road Grade (%)
Region 4
Region 3
Region 2
Region 1
CB TYPE I7, 8 ft. inlet, 24:1 cross slope, 0.042 ft/ft


Drainage Area vs. Road Grade
1.8E+05
1.5E+05
1.3E+05
1.0E+05
80000
55000
30000
Drainage Area (sq. ft.)
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
Road Grade (%)
Region 4
Region 3
Region 2
Region 1
CB TYPE 17, 8 ft. inlet, 16:1 cross slope, 0.063 ft/ft


Drainage Area vs. Road Grade
Drainage Area (sq. ft.)
Road Grade (%)
Region 4
Region 3
Region 2
Region 1
20000
19000
18000
17000
16000
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
CB TYPE 18, 12 ft. inlet, 48:1 cross slope, 0.021 ft/ft

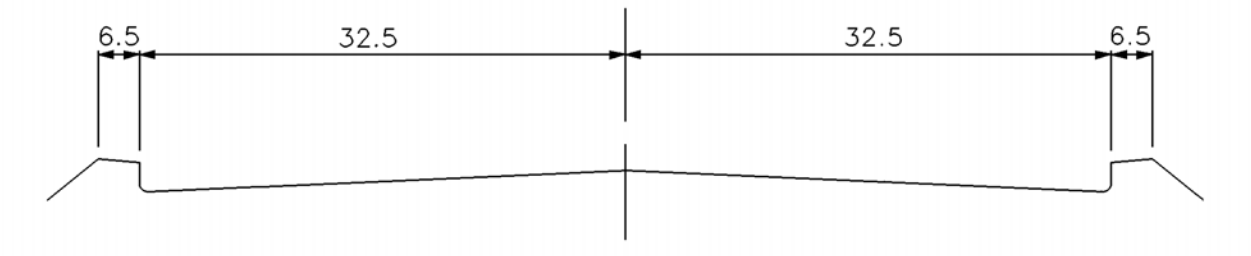

Drainage Area vs. Road Grade
Drainage Area (SQ. FT.)
30000
28000
26000
24000
22000
20000
18000
16000
14000
12000
10000
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
Region 4
Region 3
Region 2
Region 1
Road Grade (%)
CB TYPE 18, 12 ft. inlet, 36:1 cross slope, 0.028 ft/ft


Drainage Area vs. Road Grade
Drainage Area (sq. ft.)
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
Region 4
Region 3
Region 2
Region 1
Road Grade (%)
CB TYPE 18, 12 ft. inlet, 24:1 cross slope, 0.042 ft/ft


Drainage Area vs. Road Grade
1.8E+05
1.5E+05
1.3E+05
1.0E+05
80000
55000
30000
Drainage Area (sq. ft.)
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
Road Grade (%)
Region 4
Region 3
Region 2
Region 1
CB TYPE 18, 12 ft. inlet, 16:1 cross slope, 0.063 ft/ft

EXAMPLE OF COMPUTING CATCH BASIN SPACING
(CATCH BASIN TYPES 16, 17 & 18)

EXAMPLE A: Newberry County
48:1 Normal Cross Slope
2.5 % Grade



65’ Curb and gutter Section

The drainage charts for this example are shown on the following sheet.

1. Find the correct Region from the Outline Map. (Region 3)

2. Select Catch Basin Type 16, 48:1 Chart.

3. Find 2.5% grade at the bottom of the chart.

4. Draw a vertical line to the Region 3 line.

5. Draw a horizontal line to the left column.

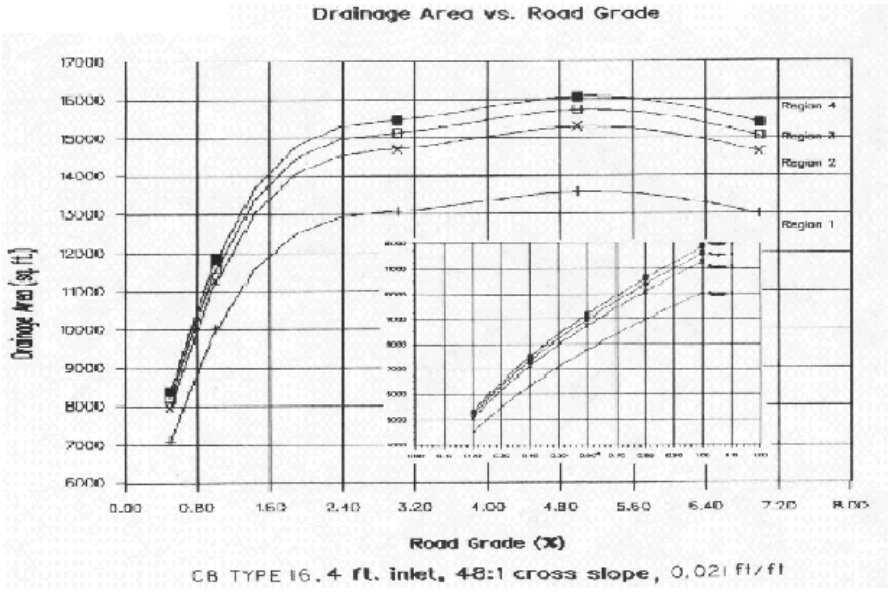
6. Read the drainage area, 15,000 sq. ft.

7. Divide the drainage area by width of roadway draining to the catch basin.
   (15,000/38.5 = 389.6′) 390 LF between Catch Basin Type 16.

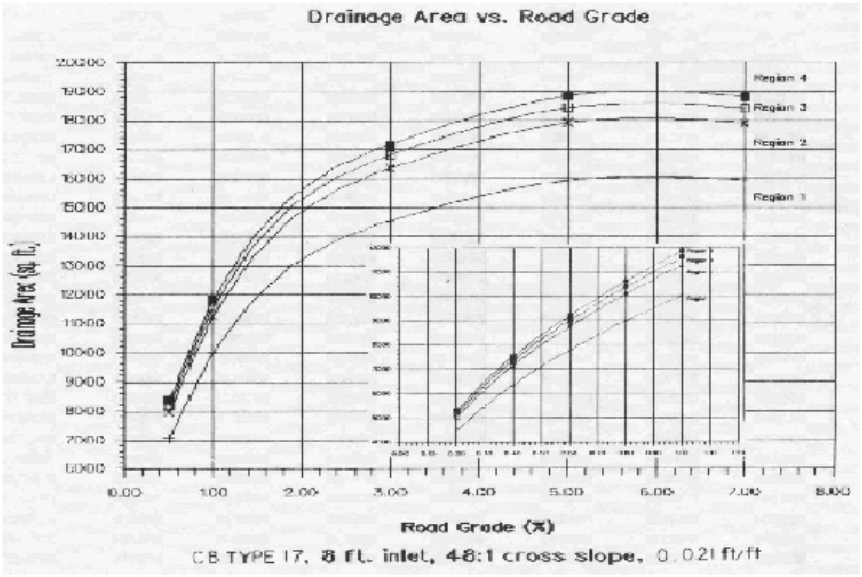
   Using the above steps check the spacing for a Catch Basin Type 17.

   Drainage area = 16,200 sq. ft.
   (16,200/38.5 = 420.8′)
   The maximum spacing is 400 LF, use 400 LF.

It would be more economically feasible to use Catch Basins Type 16 at 390 LF spacing than Catch Basins Type 17 at 400 LF spacing.



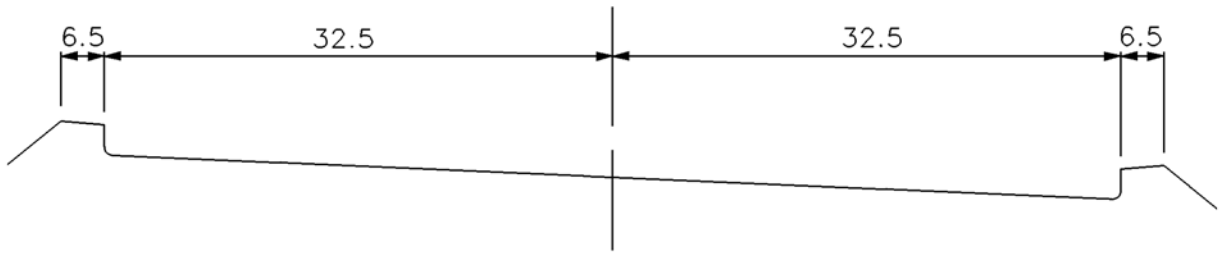
CB TYPE 16, 4 ft. inlet, 4:1 cross slope, 0.021 ft/ft



CB TYPE 17, 8 ft. inlet, 4:1 cross slope, 0.021 ft/ft

EXAMPLE OF COMPUTING CATCH BASIN SPACING
(CATCH BASIN TYPES 16, 17 & 18)

EXAMPLE B: Dorchester County
Superelevation e=0.045
0.3% Grade



65’ Superelevated Curb and Gutter Section

The drainage charts for this example are shown on the following sheet.

1. Find the correct Region from the Outline Map. (Region 1)

2. Select chart with cross slope nearest to the superelevation rate for Catch Basin Type 16. (24:1 cross slope)

3. Find 0.3% grade at the bottom of the chart. Use the inset when the grade is less than 1%.

4. Draw a vertical line to the Region 1 line.

5. Draw a horizontal line to the left column.

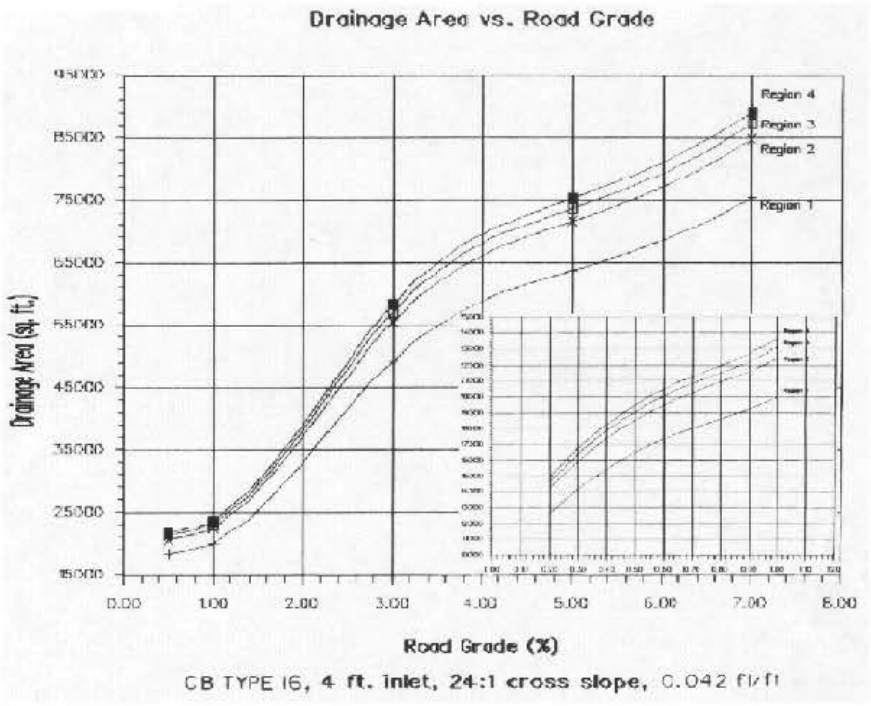
6. Read the drainage area, 14,100 sq. ft.

7. Divide the drainage area by width of roadway draining to the catch basin.
   914,100/77 = 183.1′) 185 LF between Catch Basins Type 16.

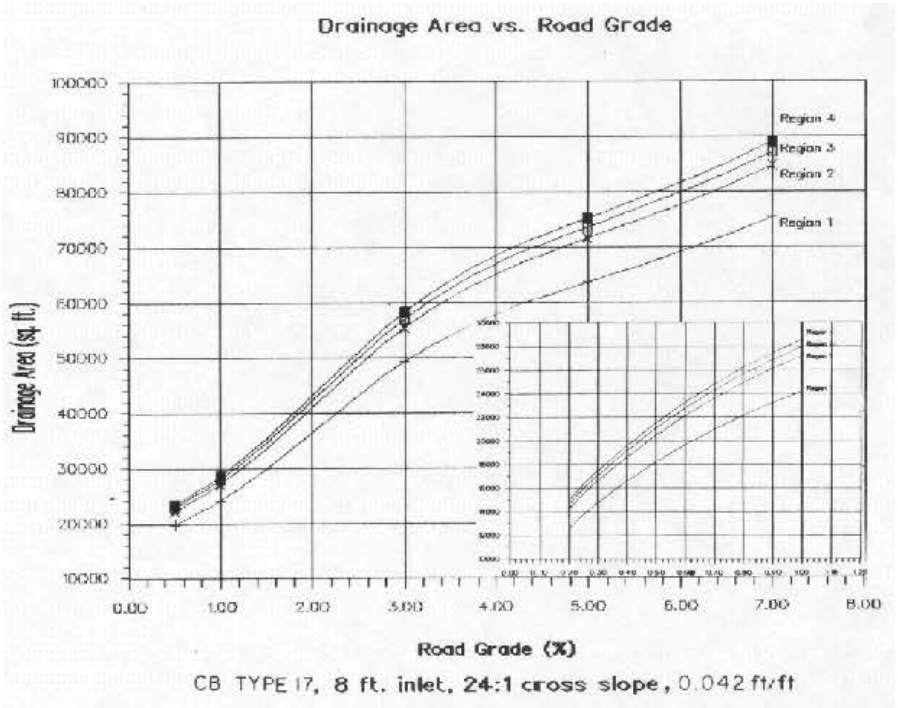
   Using the above steps check the spacing for a Catch Basin Type 17.

   Drainage area = 14.900 sq. ft.
   (14,900/77 = 193.5’)
   195 LF between Catch Basins Type 17.

It would be more economically feasible to use Catch Basins Type 16 at 185 LF spacing than Catch Basins Type 17 at 195 LF spacing.



CB TYPE 16, 4 ft. inlet, 24:1 cross slope, 0.042 ft/ft



CB TYPE 17, 8 ft. inlet, 24:1 cross slope, 0.042 ft/ft

6. Catch Basin Spacing for Type 15 Catch Basins

The following tables are for 30′ of roadway (**Table I**), and 66’ of roadway (**Table II**), sloping toward the barrier.

INSTRUCTIONS FOR USE OF THE SPACING TABLES

A. Select the chart for the correct width of roadway.

B. Find the percent of grade along the left (Vertical) column and place a horizontal line across to the graph line.

C. Place a vertical line from the point of intersection to the bottom of the chart. The figures along the bottom of the chart are the spacing between catch basins.

NOTE: MINIMUM BASIN SPACING - 150 LF
MAXIMUM BASIN SPACING - 400 LF

(TABLE I)

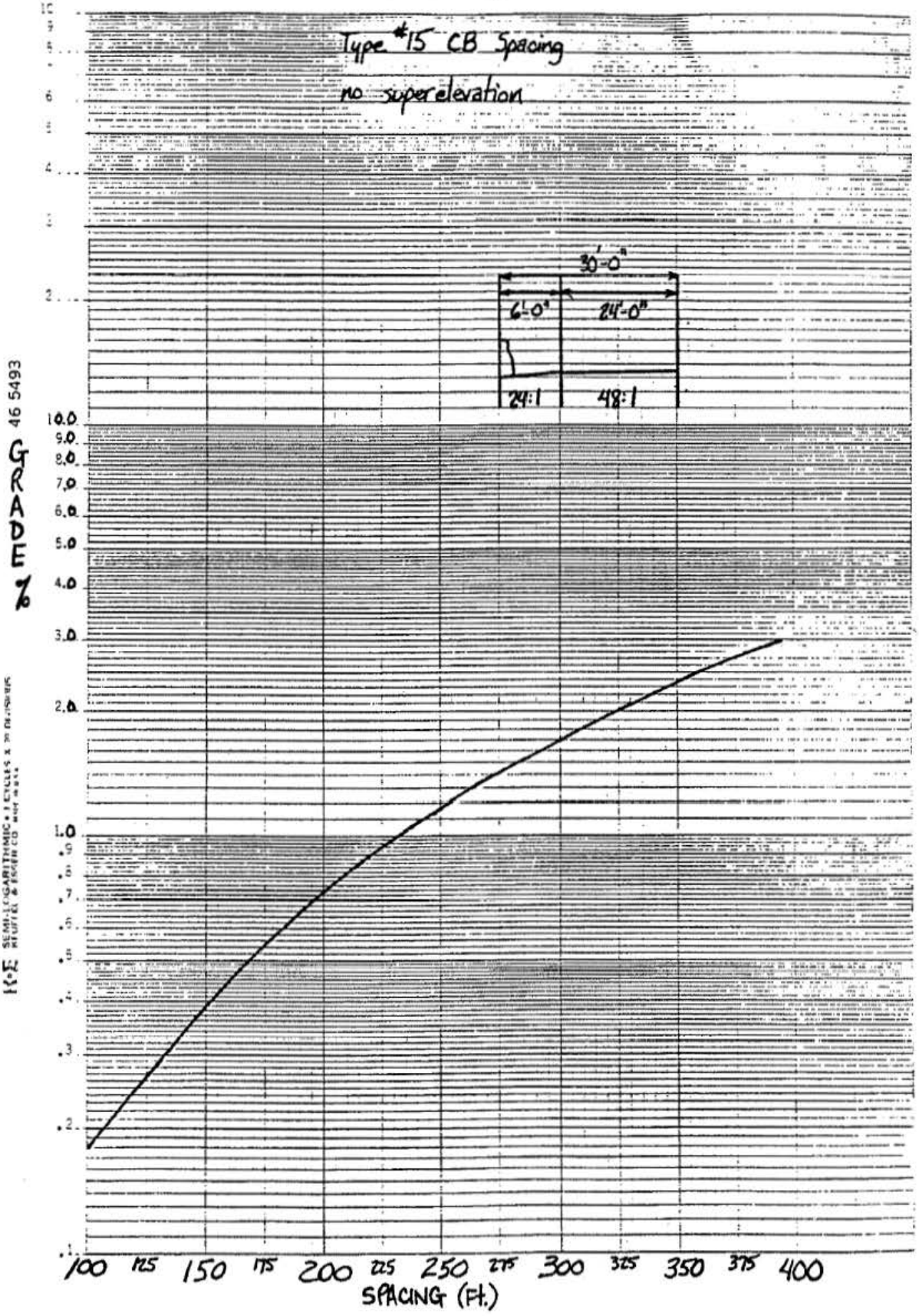
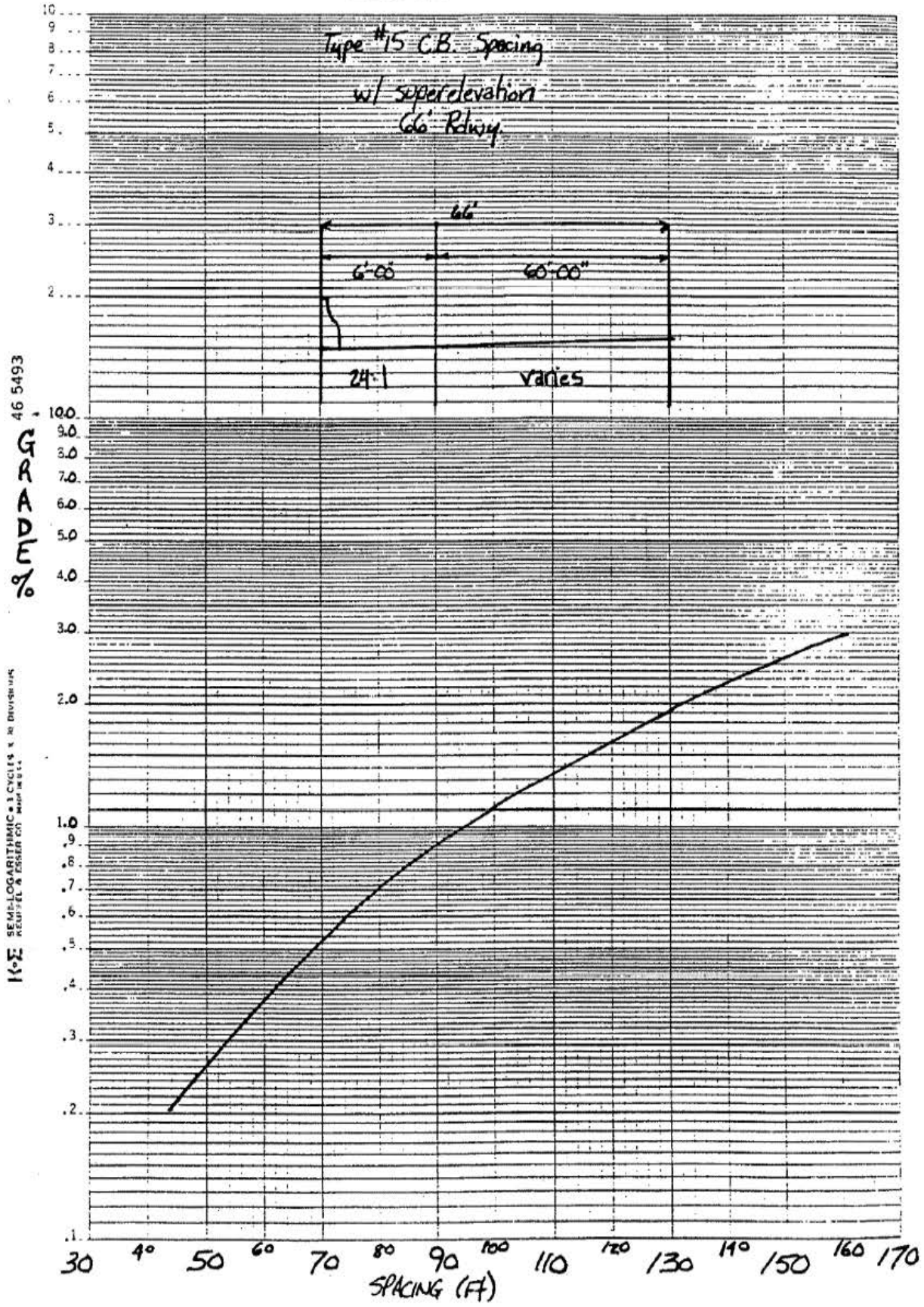

Type #15 CB Spacing
no superelevation
30'-0"
6'-0"
24'-0"
24:1
48:1
GRADE %
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
100
125
150
175
200
225
250
275
300
325
350
375
400
SPACING (Ft.)

TABLE II


Type #15 C.B. Spacing
w/ superelevation
66' Rdwy.
66'
6'-00"
60'-00"
24:1
varies
GRADE %
SPACING (FT)
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
10
9
8
7
6
5
4
3
2
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0

7. Precast Drainage Structures

1. On 60” and 72” base structures, it is generally most economical and practical to run the same size risers as the base to the top.

2. On larger bases, 84” and 96”, it is usually best to transition to smaller risers as soon as possible.

3. If a pipe intersects the structure near the top, it is usually best not to transition to smaller risers until you are above the highest pipe.

4. Allow a minimum of 8” of concrete area in the base and/or riser above or below the pipe opening.

5. The top 72” (six feet) of structure is paid for in the cost of catch basin, drop inlet, or manhole. The 6’ measurement is from the bottom of the flat slab adapter to the top of the manhole cover, top of concrete masonry, top of the hood or top of the grate.

6. The base height is measured from top of the bottom slab to the top of the full wall thickness.

7. Precast drainage structures are required for the following applications:
   A. On drainage structures with a depth equal to or greater than 12 feet.
   B. On drainage structures where the flow line elevation of the inlet pipe is equal to or higher than the inside top of the outlet pipe.
   C. As required by the plans.

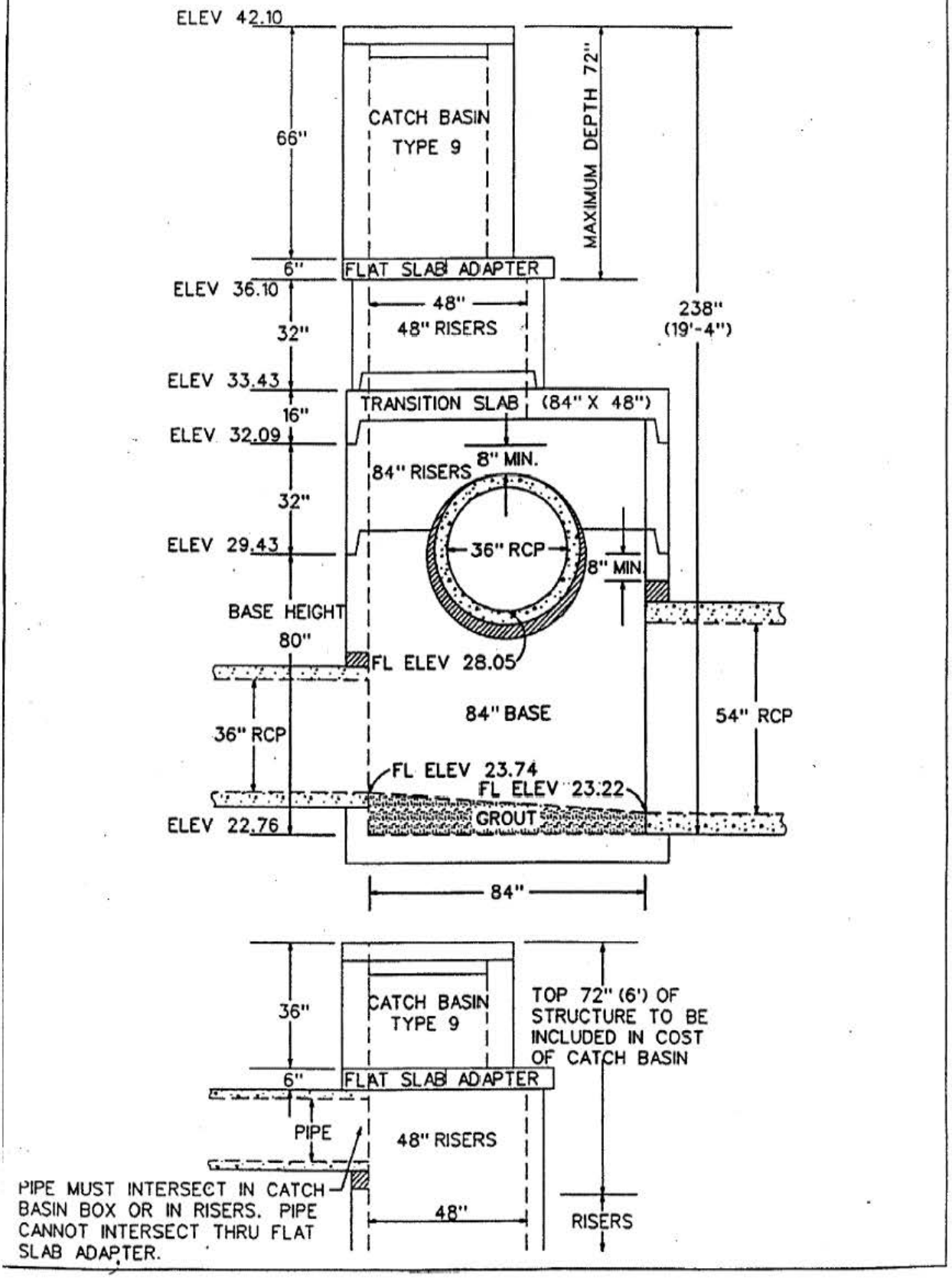
8. Precast concrete structures may be used at the option of the contractor on any other application unless prohibited by the plans or special provisions.

Drainage Base Diameter A	Drainage Base Height B	Minimum Bottom Thickness C	Maximum Pipe Diameter D
48”	48”	6”	24”
60”	60”	8”	36”
72”	72”	8”	48”
84”	80”	8”	54”
96”	88”	8”	60”
120”	96”	10”	72”

Drainage Base and/or Riser Diameter	Flat Slab Adapter Size
48”	5′-4” x 5′-4”
60”	6′-4” x 6′-4”
72”	7′-0” diameter
84”	8′-2” diameter
96”	9′-4” diameter
120”	11′-8” diameter

Maximum Pipe Openings in Precast Components			
Inside Pipe Diameter (D)	Maximum Opening (H)	Inside Pipe Diameter (D)	Maximum Opening (H)
15	24	48	64
18	28	54	72
24	34	60	78
30	42	66	84
36	48	72	92
48	55		

EXAMPLE OF PRECAST DRAINAGE STRUCTURE



8. Pipe Requirements

Pipe on Federal Aid Projects. Federal Aid Projects require alternate pipe material. Below are the acceptable criteria for specifying types of pipe.

Type of drainage installation	Alternates Required	Material
Cross drains under high type pvt. (Asph. Conc. Surf. Cr. or Concrete Pvt.)	None	Reinf. Concrete Pipe
Other cross drains	Yes (3 min.)	Reinf. Concrete Pipe Corr. Aluminum Pipe Corr. Polyethylene Pipe
Side Lines	Yes (3 min.)	Reinf. Concrete Pipe Corr. Aluminum Pipe Corr. Polyethylene Pipe
Special drainage systems (Storm Drains)	None	Reinf. Concrete Pipe
Special installation conditions	None	Specified to meet conditions

Other Materials Due to the high acidity of the South Carolina soils that corrode the walls of corrugated galvanized steel pipe, corrugated galvanized steel pipe (coated or uncoated) is not permitted in permanent installations on Department-maintained roads. However, corrugated galvanized steel pipe may be used in temporary drainage applications. When used, it shall meet the specifications of AASHTO M 36.

Polyvinyl chloride (PVC) pipe, AASHTO M 304, has been reviewed and presently will not be used on Department highway construction projects, except for underdrain applications.

End Protection All pipe must have some form of end protection. Riprap should be used for end protection on all reinforced concrete pipe. For all other types of pipe, either riprap or reinforced concrete pads may be used. Generally, for non-R.C. pipe with diameters of 36 inches and above, riprap should be placed at each end unless another approved system is specified. For non-R.C. pipe with diameters less than 36 inches, cast-in-place concrete pads should be used for end protection. See Standard Drawing No. 802-1 for more details on concrete pads.

When using riprap for end protection, a minimum of two feet of riprap should be placed on each side of the opening of the pipe and a minimum of one foot on top above the opening. Riprap will be estimated at one ton for each pipe sizes 30” and under. Riprap for pipe over 30” and under 84” will be estimated at 3 tons for each end. Riprap for larger diameters will be calculated separately.

R. C. Pipe may be used on all applications. Class III shall be used on Interstate Projects with cover up to 15 feet and up to 20 feet on other roads. Class IV is to be used with cover over 15 feet on Interstate and over 20 feet on other roads. Class V is specified under Railroads.

When corrugated aluminum pipe is specified, the following procedures should be followed.

1) In crossline applications, corrugated aluminum pipe diameters will be one standard pipe size larger than reinforced concrete pipe.

2) Any application, including those above, of a corrugated aluminum pipe in a critical or sensitive drainage area should be sized by Hydrology.

3) Storm sewer applications of corrugated aluminum pipe must be sized by Hydrology.

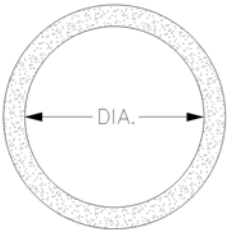
Minimum cover during construction for CAA pipe is required and varies according to size. These figures are included in a fill height table on Standard Drawing No. 714-2.

Side Line Pipe. In addition to the previous requirements a minimum length of 24 feet of usable pipe shall be installed in driveways.
Pipe Line Parallel to Railroad Tracks. A minimum 24" diameter pipe shall be used when pipe installations are parallel to railroad tracks, on railroad Right of Way.
Cross Line Pipe on Profile. At the pipe station draw an ellipse representing the pipe at the correct elevation and dimension on the profile. Show drainage information only if received from the Hydrology Section. Do not use Talberts Formula.
Cross Line pipe under Railroad. Cross Line pipe under railroads shall be Class V or what may be required by the railroad company.
Minimum Cover For Pipe. Minimum cover for all pipe should be one foot.

Corrugated high-density polyethylene (HDPE) pipe (Type S) meeting AASHTO M 294 may be selected for use on a construction project. Smooth interior wall (Type S) is the only HDPE pipe approved for permanent applications by the Department. Type C (single wall) may be used in temporary applications. HDPE pipe may be used under embankments of up to twenty feet high. If fill heights are greater than twenty feet, a special review of the HDPE pipe application should be done.

9. Concrete Pipe Data

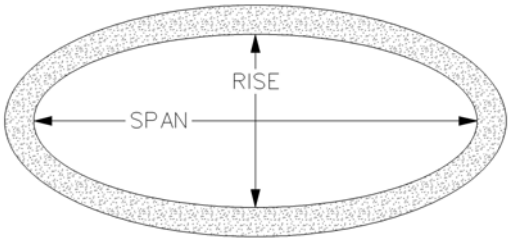
Round Concrete Pipe



Reinforced Concrete Pipe Class III

ASTM- C-76 Dia.	ASSHTO M-170 (Wall B) Wall Thickness	Area (SF)
15”	2¼” (0.1875’)	1.23
18”	2½” (0.2083’)	1.77
24”	3” (0.2500’)	3.14
30”	3½” (0.2917’)	4.91
36”	4” (0.3333’)	7.07
42”	4½” (0.3750’)	9.62
48”	5” (0.4167’)	12.6
54”	5½” (0.4583’)	15.9
60”	6” (0.5000’)	19.6
72”	7” (0.5833’)	28.3
84”	8” (0.6667’)	38.5
96”	9” (0.7500’)	50.3

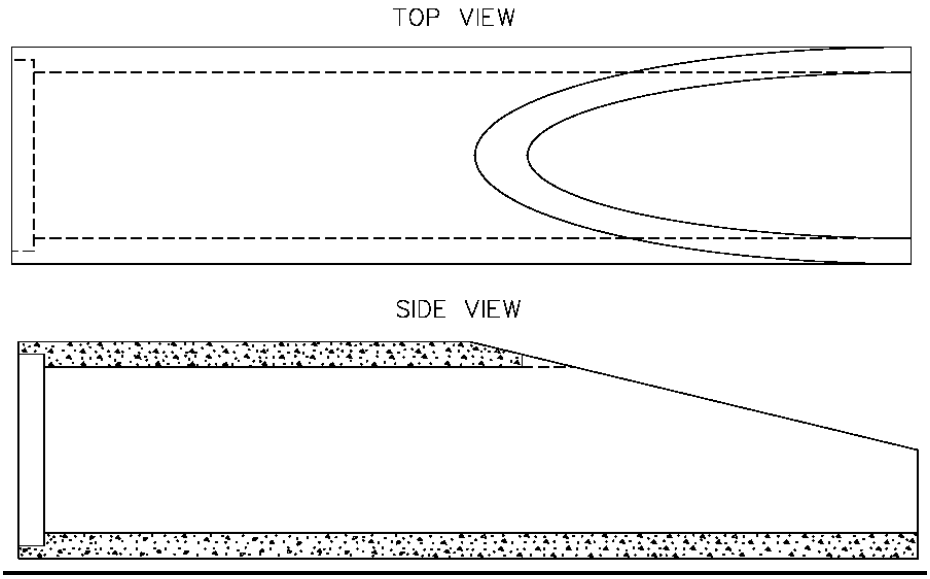
Horizontal Elliptical Pipe



Reinforced Concrete Pipe Class HE-III

Diameter, Equivalent Round Size, in.	ASTM- C-507 Designated rise, in. x span, in.	ASSHTO M-207 Minimum wall thickness in.	Full flow water area Sq. Ft.
18	14 x 23	2¾	1.83
24	19 x 30	3¼	3.28
30	24 x 38	3¾	5.10
36	29 x 45	4½	7.36
42	34 x 53	5	10.2
48	38 x 60	$5^{1/5}$	12.9
54	43 x 68	6	16.7
60	48 x 76	6½	20.5
72	58 x 91	7½	29.4
84	68 x 106	8½	40.1
96	77 x 121	9½	52.4

10. Beveled End Sections



Cross line pipe: Cross line pipe on primary projects shall have beveled end sections. In figuring the length of pipe required to span the fill wherein beveled end sections are to be used, consideration should be given to the usable length of a beveled end section. All beveled end sections are 8′ long with varying lengths of solid pipe (usable). For estimating purposes, the usable and non-usable lengths are as follows:

Pipe Diameter (in.)	Usable Length (ft.)	Non-Usable Length (ft.)
15	6	2
18	5	3
24	4	4
30	3	5
36	2	6
42	2	6
48	2	6

For example, 32’ of 18” R.C Pipe is to be added to existing R.C. Pipe to span a fill. The contractor will only need 22’ of 18” R.C. Pipe since 2 beveled end sections of 18” R.C. Pipe yields 10’ of usable pipe. Rounding 22’ up to 24’ (making length divisible by 4), the note in the plans should state:

ADD (or, PLACE) 24’ – 18” R.C. PIPE AND PLACE 2 – 18” BEVELED END SECTIONS

Sideline Pipe: Sideline installations with beveled end sections may be bid in one of two methods: 1) simply R.C. Pipe or 2) as an alternate – R.C. Pipe. Corrugated Aluminum Alloy Pipe or Corrugated High Density Polyethylene Pipe can also be used for sideline installations. If method 1 is used, the same procedure for estimating crossline pipe as detailed above should be used. If method 2 is used, the total length of pipe includes the beveled end section and the length of non-usable pipe must be considered.

For example, the length of 15" pipe needed for a driveway installation is 28'. However, the contractor will need 32' in this instance since 2 beveled end sections of 15" R.C. Pipe yields 4' of non-usable pipe. The note in the plans should state:

PLACE 32' – 15" ALT. PIPE WHICH INCLUDES 2 – 15" BEVELED END SECTIONS

For more information about beveled end sections and usable lengths, see Standard Drawing No. 714-1.

In summary, crossline pipe and sideline pipe not bid as an alternate shall have beveled end sections set up as a separate bid item. The beveled end sections have varying lengths of usable pipe that must be deducted from the length of pipe normally required. When sideline pipe is bid in the alternate format, the length of pipe includes the total length of pipe and the beveled end sections which include that portion that is non-usable. The beveled end sections have varying lengths of non-usable pipe that must be added to the length of pipe normally required.

The Federal Highway Administration has recommended the use of "Beveled End Pipe" on all crossline and sideline installations within the 30′ clear zone on federally funded projects. In the case of a stub pipe behind a curb and gutter section, it will not be necessary to use "Beveled End Pipe" where a vehicle is not likely to come into contact with the pipe. Another situation might be a crossline under a high fill protected by guardrail. These situations need to be determined on a case-by-case basis.

Alternate sideline pipe bids will also be used and set up as follows:

Example for General Construction Note for additional pipe:

____L. F. of _____" ( ) Alternate Pipe --- _____L. F. for side lines (includes two beveled end pipes per location) No separate payment will be made for the beveled end pipes.

Example of pipe note on plan sheets:

Place ____L. F. of ____" or ( ) Alternate Pipe (includes _____ Beveled End Sections)

When using alternate sideline pipe, place a note on the outside of the cover notifying the Specification and Estimate Group to include an explanation in the Contract Special Provisions.

A note will be shown on the General Construction Note as follows:

Alternate Pipe Selection Notes:

When Corrugated Aluminum Alloy Pipe is selected for use, the diameters will be one standard pipe size larger than Reinforced Concrete Pipe.

Alternate Pipe for sidelines must have each end beveled to match the adjacent slopes. No separate payment will be made for providing these beveled ends.

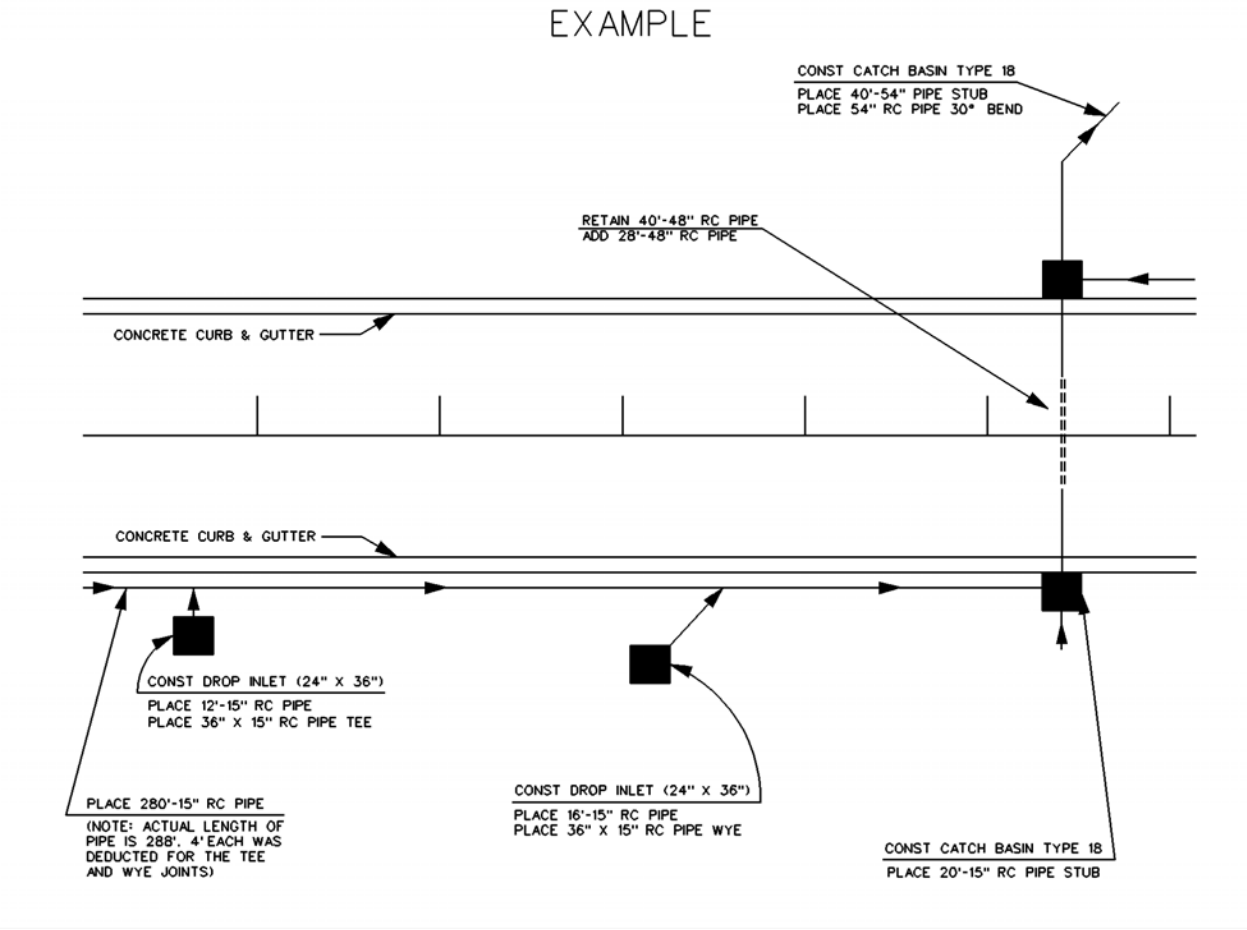
Corrugated Aluminum Alloy Pipe & Corrugated High Density Polyethylene Pipe for sidlines must have cast in place concrete pads to match the adjacent slopes as shown in Standard Drawing No. 802-1. No separate payment will be made for providing these cast in place concrete pads.

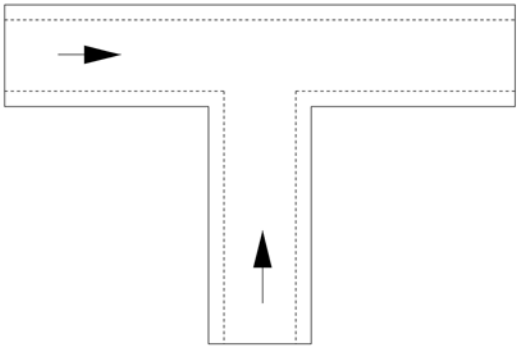
11. Pipe Tee Joints, WYE Joints and Bends

The bid items on quantity sheets shall be:
_____ x _____" R. C. Pipe Culvert Tee (Class III) ------Each
The first diameter of the tee joint shall be the thru or larger pipe and the second diameter shall be the tee joint.

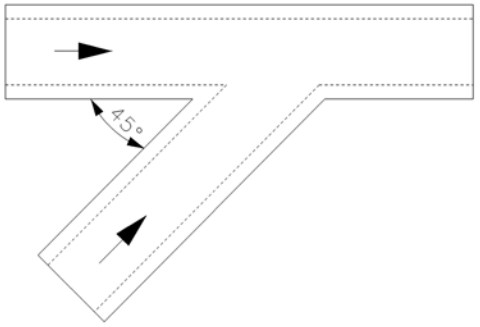
_____ x _____" R. C. Pipe Culvert WYE (Class III) ------Each
The first diameter of the Wye Joint shall be the thru or larger pipe and the second diameter shall be the WYE Joint.

_____" R. C. Pipe _____ DEG. BEND (Class III) ------EACH
The degree of bends are 30°, 45°, and 90°.

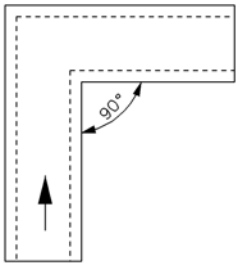




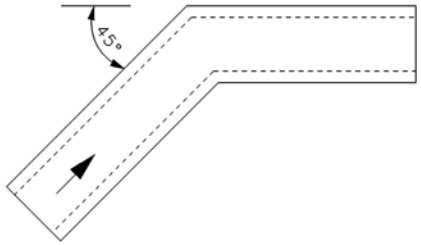
TEE JOINT



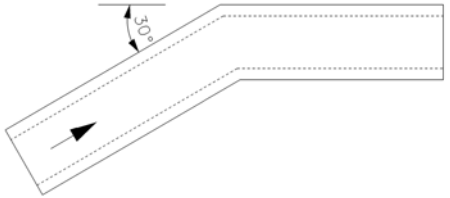
WYE JOINT (45°)



BEND (90°)



BEND (45°)



BEND (30°)

12. Criteria for Placing Paved Gutter

PERCENT OF GRADE	DISTANCE TO CARRY WATER BEFORE BEGINNING PAVED GUTTER
0.00% - 0.49%	NO PAVED GUTTER
0.50% - 0.99%	1000 LF
1.00% - 1.99%	500 LF
2.00% +	250 LF

13. Culvert Sketches

Culvert sketches are required by the Structural Design Group. Road Design needs to furnish the Structural Design Group with a plan and profile sheet, typical section and culvert information. The Structural Design Group will incorporate this information into their culvert plans that will be returned to Road Design to put into our final construction plans. Road Design Group Coordinators are to see that excavation for culverts are calculated within their Design Group.

14. Curb Profile

In order to acquire proper drainage, especially at low points in sag vertical curves and in superelevated sections, it is requested that curb profiles be provided in the plans for all curb and gutter projects when the length of any section of curb and gutter is three hundred feet long or greater. Curb profiles will not be required for radius returns, unless it is deemed necessary for placing drainage in those areas. Vertical curve data for curbs and/or sidewalks will still be placed on the "Reference Sheet" in the plans.

15. Green Areas

Curbs in Green Areas in center of roadways will be 2.5' sloping curb and gutter unless otherwise directed by the Road Design Engineer. Curb Grades will be provided and shown in plans for these Green Areas. Attention will be given to eliminate areas that trap water in transition from normal to superelevated sections. Cross Slopes in median will be 12:1 or follow the rate of superelevation. If sloping curbs are recommended, they are to be constructed in accordance to Standard Drawing 720-1.

Types of curbs are affected by design speed. 9" x 15" curbs are not allowed due to constructability problems.

16. Trench Drain Applications

Trench drains should be considered when surface flows are suspected to interfere with traffic operations. Water draining from an adjacent property through a drive toward the roadway can be intercepted by a trench drain installed across the driveway and deposited into the parallel ditch or into a drainage box. In this case, the Trench Drain – 8" Interior Dimension (Driveway Application) may be used.

In curb and gutter sections, the typical section provides for water to get to the gutter. However, when rehabilitating and widening a section of roadway that was previously a ditch section but is now a curb and gutter section, grades, vertical curves and superelevation rotation can create obstacles in getting water to the desired catch basins and storm sewers. Typically, the minimum desired gutter grade is 0.5%; however, 0.3% may be used with adequate cross-slope. Under close scrutiny, 0.2% has been used on short distances and occasionally assisted by increasing the cross-slope. The length of curve can create relatively flat locations on a crest and in a sag vertical curve. Where feasible, catch basin spacing may be reduced to facilitate drainage.

When additional pipe and catch basins are not feasible or the area is not conducive to a catch basin, such as in a driveway, then trench drains may be installed in the gutters to enhance the drainage of the roadway. Trench drains in gutters will reduce potential ponding in the gutter area caused by inherent near flat grades occurring in areas being superelevated and in vertical curves. Typically, the flow line of a trench drain is fixed at 0.6%, but will vary according to the grade of the gutter. Trench drains can be placed in an opposing direction to the gutter grade, as long as the gutter grade does not exceed 0.2% in the opposite direction. For example, this would yield a trench drain flow line grade of 0.4% in a gutter with an opposing grade of 0.2%. This composite grade of the trench drain flow line should not be less than 0.4%.

The guidelines for trench drain use in gutters are:

1. When grades in the gutter are $\leq 0.1\%$. Actual elevations on profile must be checked to determine percent grade in vertical curves.
2. Drainage box within 96 LF to outlet the trench drain.
3. Trench drain must be designed in 16 foot increments. Maximum length of trench drain in one run is 96 LF.
4. Place location and quantity information on "General Construction Note" Sheet as shown on page 9-40.

Quantities for trench drain and curb and gutter will not overlap. When trench drain is extended through a driveway in the gutter, measurement of the trench drain will be made only where the curb and gutter normally is measured. This is typically in drives where the curb drops to the gutter elevation and does not turn away from the roadway on a radius to follow the edge of the driveway. In cases of a driveway where the curb follows a radius away from the roadway, and the trench drain extends into or through the driveway, then the trench drain that is not in the curb and gutter will be measured and paid for as Trench Drain (Driveway). The width of the trench drain including the standard concrete width for the drain will be deducted from the area measurement for concrete driveway.

The pay items for trench drains are:

7192091	Trench Drain – 4” Interior Dimension with 1.5’ curb & gutter	LF
7192092	Trench Drain – 4” Interior Dimension with 2.0’ curb & gutter	LF
7192093	Trench Drain – 4” Interior Dimension with 2.5’ curb & gutter	LF
719209A	Trench Drain – 4” Interior Dimension (Driveway Application)	LF
719209E	Trench Drain – 8” Interior Dimension (Driveway Application)	LF

GENERAL CONSTRUCTION NOTE

CHANGES INVOLVING INCREASED COST OF PROJECT OR CHANGES IN ALIGNMENT MUST BE SPECIFICALLY AUTHORIZED BY THE STATE HIGHWAY ENGINEER. DISTRICT ENGINEERING ADMINISTRATOR MAY AUTHORIZE MINOR ALTERATIONS NOT IN CONFLICT WITH THE STANDARD PRACTICES OF THE DEPARTMENT AND NOT INVOLVING INCREASES IN COST. FORWARD INFORMATION ON ANY CHANGE IN ALIGNMENT TO THE COLUMBIA OFFICE AS SOON AS THE REVISION IS COMPLETED.

SEE INDIVIDUAL CURVES ON PLANS FOR SUPERELEVATION RATE AND DESIGN SPEED.

THE FOLLOWING QUANTITIES ARE NOT SHOWN IN DETAIL ON THE PLANS BUT ARE INCLUDED IN THE SUMMARY OF ESTIMATED QUANTITIES AND MAY BE VARIED DURING CONSTRUCTION AS DIRECTED BY THE ENGINEER.

CLEARING AND GRUBBING DITCHES	2.0 ACRE	FOR OUTFALL DITCHES
REMOVAL AND DISPOSAL OF EXISTING PAVEMENT	385 S.Y.	WHERE DIRECTED BY THE ENGINEER
REMOVAL AND DISPOSAL OF EXISTING ASPHALT PAVEMENT	9240 S.Y.	ALL REMOVAL AND DISPOSAL OF EXISTING ASPHALT PAVEMENT WILL BE MEASURED AND PAID FOR AS DESCRIBED IN THE SPECIAL PROVISIONS
GEOGRID REINF. (BIAXIAL)	6000 S.Y.	WHERE DIRECTED BY THE ENGINEER
UNCLASSIFIED EXCAVATION	38,500 C.Y.	FOR REMOVAL AND DISPOSAL OF UNSTABLE MATERIAL
BORROW EXCAVATION	83,300 C.Y.	FOR REPLACEMENT OF UNSTABLE MATERIAL
FLOWABLE FILL	52 C.Y.	FOR PLUGGING ABANDONED PIPES
MAINTENANCE STONE	250 TON	FOR MAINTENANCE OF DRIVES
PORTLAND CEMENT	1241 TON	FOR CEMENT STABILIZED EARTH BASE (8" UNIF.)
ASHP. AGG. BASE COURSE	327 TON	FOR WIDENING 6' OR LESS
LIQUID ASPHALT BINDER PG.64-22	242 TON	FOR DRIVES AND LEVELING
	14 TON	FOR WIDENING 6' OR LESS
MILLING EXISTING ASPHALT PAVEMENT (VAR.)	670 S.Y.	WHERE DIRECTED BY THE ENGINEER
ASPH. CONC. BINDER COURSE	4627 TON	FOR BUILD-UP AND LEVELING
ASPH. CONC. SURF. COURSE	189 TON	FOR DRIVES AND SIDE ROAD TIE-INS (@ 200 LBS/SY)
CONCRETE FOR STRUCTURES (CLASS 3000)	60 C.Y.	WHERE DIRECTED BY THE ENGINEER
CONCRETE FOR STRUCTURES (CLASS 2500)	1 C.Y.	WHERE DIRECTED BY THE ENGINEER
ARCH. FINISH FOR RET. WALL	4950 SF	FOR CONC. MEDIAN BARRIER AT U.S. RTE. I-95
REINFORCING STEEL FOR STRUCTURES (ROADWAY)	3543 LBS	WHERE DIRECTED BY THE ENGINEER
15" R.C. PIPE CULVERT	150 L.F.	FOR ADDITIONAL SIDE LINES
18" R.C. PIPE CULVERT	150 L.F.	FOR ADDITIONAL SIDE LINES
24" R.C. PIPE CULVERT	150 L.F.	FOR ADDITIONAL SIDE LINES
15"X15" R.C. PIPE CULVERT TEE	5 EA.	WHERE DIRECTED BY THE ENGINEER
TYPE 18 CATCH BASIN	1 EA.	WHERE DIRECTED BY THE ENGINEER
DROP INLET (24"X36")	5 EA.	WHERE DIRECTED BY THE ENGINEER
TRENCH DRAIN (4"ID GUTTER)	1406 L.F.	TO ENHANCE DRAINAGE
MANHOLE	6 EA.	WHERE DIRECTED BY THE ENGINEER
CONCRETE DRIVEWAY (6" UNIFORM)	2050 S.Y.	FOR DRIVES
AGGREGATE UNDERDRAIN	85 C.Y.	FOR ADDITIONAL UNDERDRAIN TRENCH BACKFILL
6" PERFORATED PIPE UNDERDRAIN	500 L.F.	FOR SUBSURFACE DRAINAGE
RIP-RAP (CLASS B)	100 TON	WHERE DIRECTED BY THE ENGINEER
GEOTEX./EROS. CONTROL UNDER RIP-RAP (UNPROTECTED)-CL2	300 S.Y.	TO BE PLACED UNDER RIP-RAP
ADDITIONAL LENGTH GUARDRAIL POST	210 L.F.	WHERE DIRECTED BY THE ENGINEER
RESET FENCE	2080 L.F.	FOR RESETTING EXISTING FENCE
RESET CHAIN LINK FENCE	1500 L.F.	FOR RESETTING EXISTING FENCE
RESET RIGHT OF WAY MARKER	4 EA.	WHERE DIRECTED BY THE ENGINEER

EROSION CONTROL ITEMS

SEEDING (UNMULCHED)	46.920 M.S.Y.	FOR ALL DISTURBED AREAS
TEMPORARY SEEDING	23.080 M.S.Y.	FOR ALL DISTURBED AREAS
FERTILIZER (10-10-10)	5.966 TON	FOR ALL DISTURBED AREAS
LIME	9.547 TON	FOR ALL DISTURBED AREAS
NITROGEN	458 LBS.	FOR ALL DISTURBED AREAS
MOWING	69.240 M.S.Y.	WHERE DIRECTED BY THE ENGINEER
SODDING	50 S.Y.	FOR TEMPORARY EROSION CONTROL
BALED STRAW	578 EA.	FOR TEMPORARY EROSION CONTROL
SILT FENCE	2000 L.F.	FOR TEMPORARY EROSION CONTROL
SILT BASINS	1000 C.Y.	FOR TEMPORARY EROSION CONTROL

TRENCH DRAIN 4" ID (GUTTER) LOCATIONS

STATION	STATION	LT OR RT.	LF
84+86	512' R	RT.	84
85+36	50' R	RT.	80
86+54	87+50	RT.	96
87+54	88+50	RT.	96
112+35	112+83	LT.	48
112+35	112+83	RT.	48
140+97	40' R	LT.	84
143+11	141+78	RT.	64
141+75	142+23	RT.	48
142+16	40' R	LT.	64
150+04	151+00	LT.	96
151+00	151+32	LT.	32
151+36	151+50	LT.	18
151+03	151+32	RT.	32
151+36	154+50	RT.	98
156+53	157+33	RT.	80
156+92	157+42	LT.	80
189+19	40' R	RT.	84
188+25	189+41	LT.	16
190+60	191+00	RT.	48
190+54	191+18	LT.	64
SUBTOTAL			1218
INCLUSION			192
TOTAL			1406

NOTE:
TO BE PLACED IN MULTIPLES OF 16' UP TO 96' MAX. LENGTH.

NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____ SQUAD ____ - ____
E/R _____ DATE _____

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
ROAD DESIGN COLUMBIA, S.C.

SCALE 1"= DWG. NO. (19)

Plan Preparation Guide

Chapter 10

Clear Zone ---- Guardrail

Crash Cushions --- Barriers --- Walls

1. Clear Zone Concept

The clear zone is the roadside area that should have traversable slopes and contain no natural or man made objects that are considered non-yielding. The clear zone begins at the edge of the travelway and extends a distance as determined by the following graph and table.

If the clear zone distance is impractical to meet, then a roadside barrier (guardrail, etc.) should be used.

Clear Zone Distance Table
(in feet from edge of travelway)

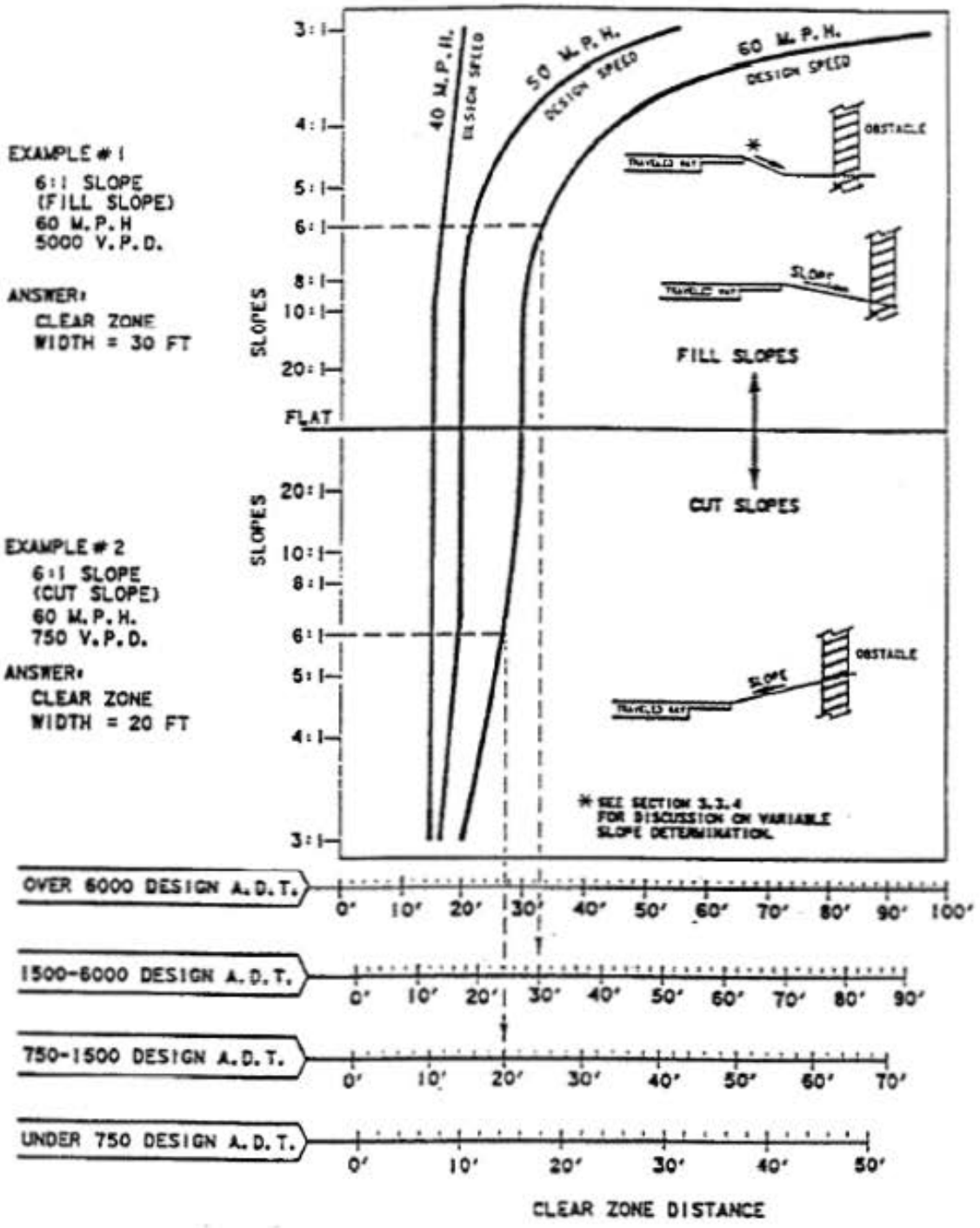
Design Speed	Design ADT	Fill Slopes			Cut Slopes		
		6:1 or Flatter	5:1 to 4:1	3:1	3:1	4:1 to 5:1	6:1 or flatter
40 MPH or less	Under 750	7-10	7-10	**	7-10	7-10	7-10
	750-1500	10-12	12-14	**	10-12	10-12	10-12
	1500-6000	12-14	14-16	**	12-14	12-14	12-14
	Over 6000	14-16	16-18	**	14-16	14-16	14-16
45-50 MPH							
	Under 750	10-12	12-14	**	8-10	8-10	10-12
	750-1500	12-14	16-20	**	10-12	12-14	14-16
	1500-6000	16-18	20-26	**	12-14	14-16	16-18
	Over 6000	18-20	24-28	**	14-16	18-20	20-22
55 MPH							
	Under 750	12-14	14-18	**	8-10	10-12	10-12
	750-1500	16-18	20-24	**	10-12	14-16	16-18
	1500-6000	20-22	24-30	**	14-16	16-18	20-22
	Over 6000	22-24	26-32*	**	16-18	20-22	22-24
60 MPH							
	Under 750	16-18	20-24	**	10-12	12-14	14-16
	750-1500	20-24	26-32*	**	12-14	16-18	20-22
	1500-6000	26-30	32-40*	**	14-18	18-22	24-26
	Over 6000	30-32*	36-44*	**	20-22	24-26	26-28
65-70 MPH							
	Under 750	18-20	20-26	**	10-12	14-16	14-16
	750-1500	24-26	28-36*	**	12-16	18-20	20-22
	1500-6000	28-32*	34-42*	**	16-20	22-24	26-28
	Over 6000	30-34*	38-46*	**	22-24	26-30	28-30

* Clear zones are limited to 30 feet for practicality and to provide a consistent roadway template as long as previous experience with similar projects or designs indicates satisfactory performance. Where a site specific investigation indicates a high probability of continuing accidents, or such occurrences are indicated by accident history, the designer may provide clear zone distances greater than 30 feet, as indicated.

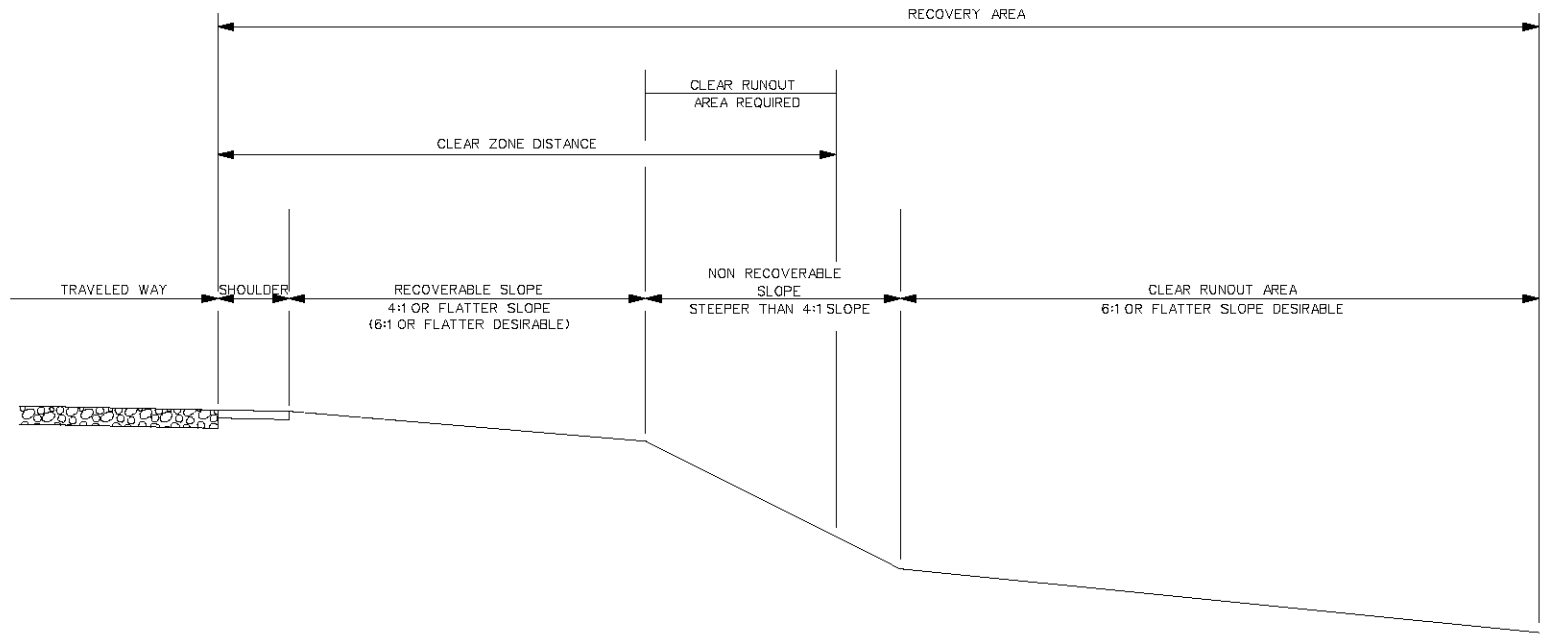
** Since recovery is less likely on the unshielded, traversable 3:1 slopes, fixed objects should not be present in the vicinity of the toe of these slopes. Recovery of high speed vehicles that encroach beyond the edge of shoulder may be expected to occur beyond the toe of slope. Determination of the width of the recovery area at the toe of slope should take into consideration right-of-way availability, environmental concerns, economic factors, safety needs, and accident histories. Also, the distance between the edge of the travel lane and the beginning of the 3:1 slope should influence the recovery area provided at the toe of slope.

A clear zone distance graph, embankment examples and recommended ditch slope are shown on the following sheets.

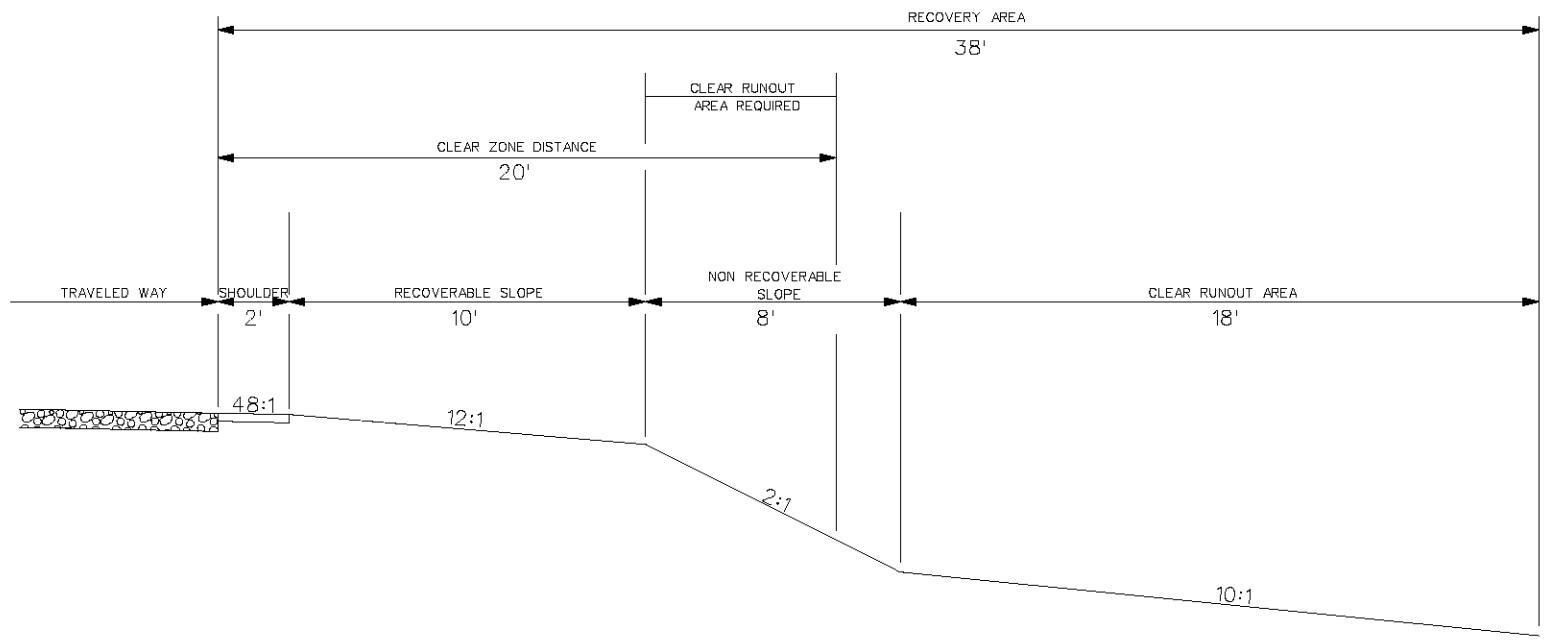
CLEAR ZONE DISTANCE GRAPH
(In feet from edge of travelway)



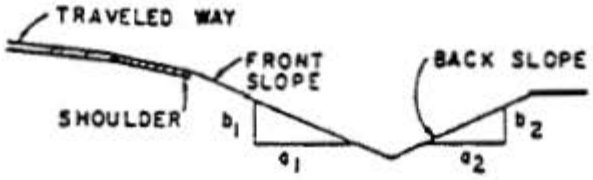
CLEAR ZONE EXAMPLE OF AN EMBANKMENT

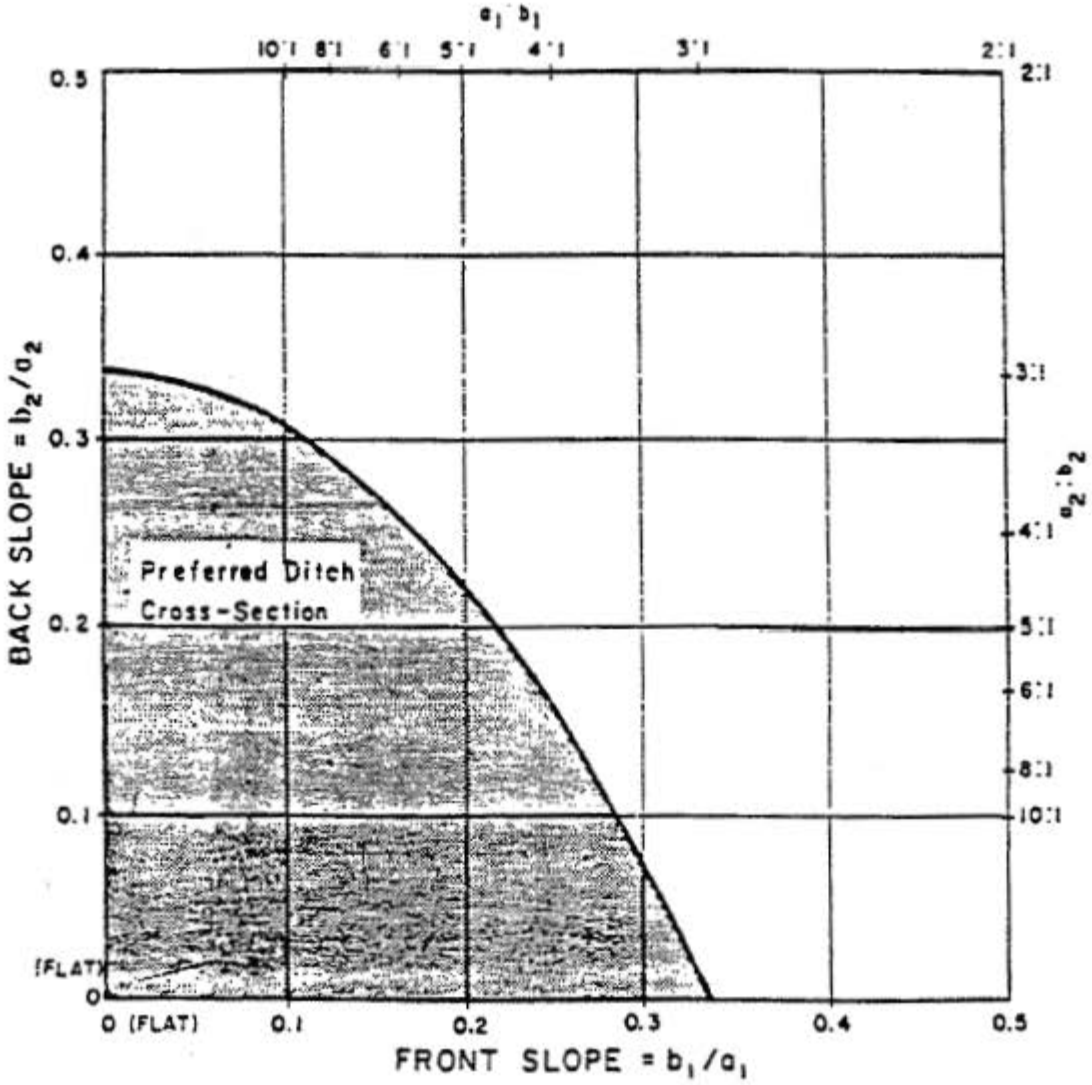


DESIGN ADT: 7000
DESIGN SPEED: 60 MPH
CLEAR ZONE DISTANCE FROM TABLE: 30'



RECOMMENDED DITCH SLOPES & BACK SLOPES





2. Guardrail

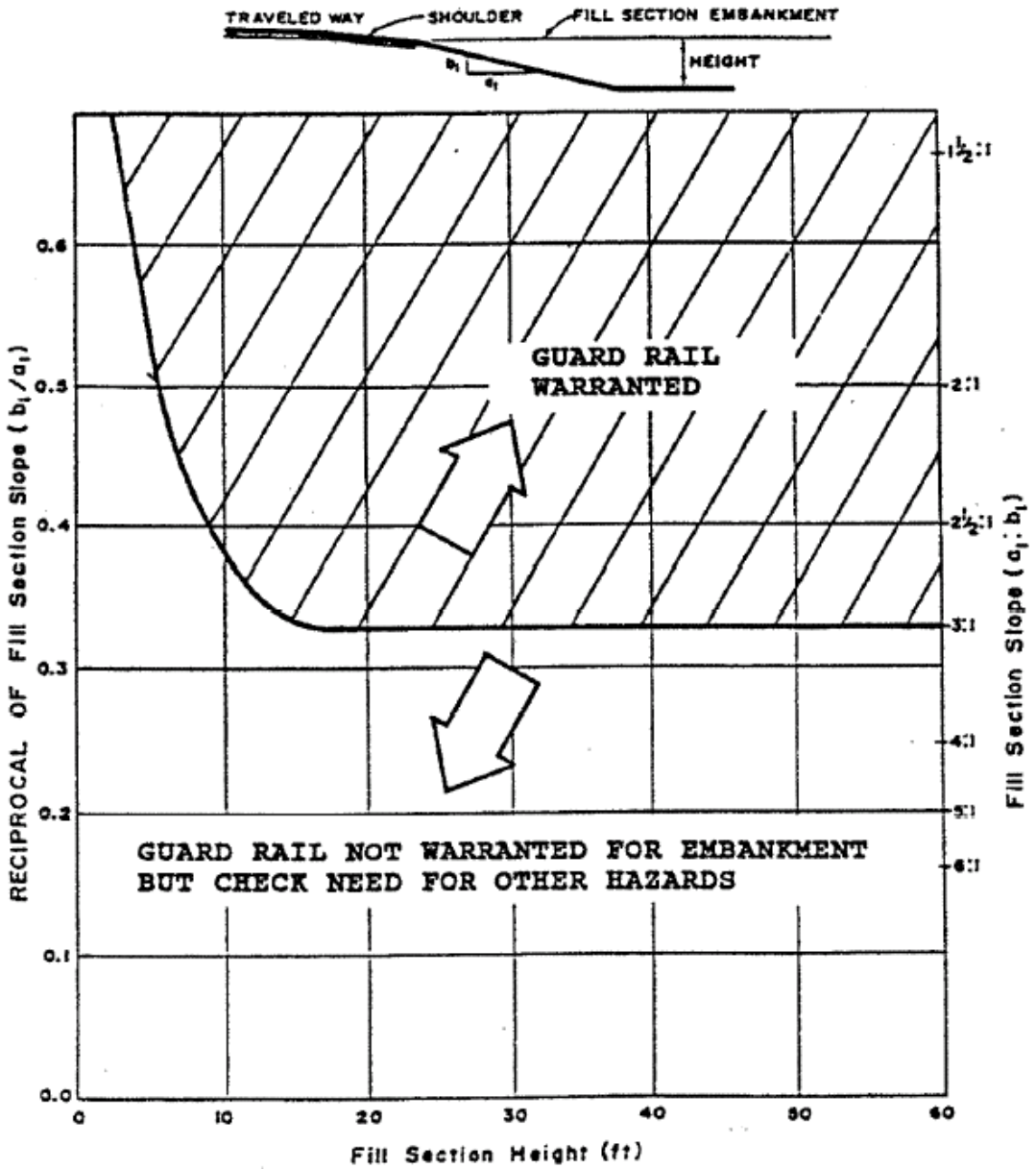
Guardrail is used to protect traffic from roadside obstacles and steep slopes. SCDOT does not use guardrail on secondary ('C') projects except at bridge ends or low speed urban projects, which are usually curb and gutter.

Guardrail is figured in multiples of 12.5′. There are three types of standard guardrails. They are Steel Beam Guardrail (W-Beam), Thrie Beam Guardrail, and Tubular Guardrail. Tubular Guardrail is not generally used due to maintenance problems.

Guardrail is discouraged with curbs on high speed highways (greater than 45 mph).

The extra width of shoulder and widening for end anchors should be plotted on the cross sections and construction lines shown on plan sheet.

Below is a table recommending where guardrail should be used due to steep slopes.

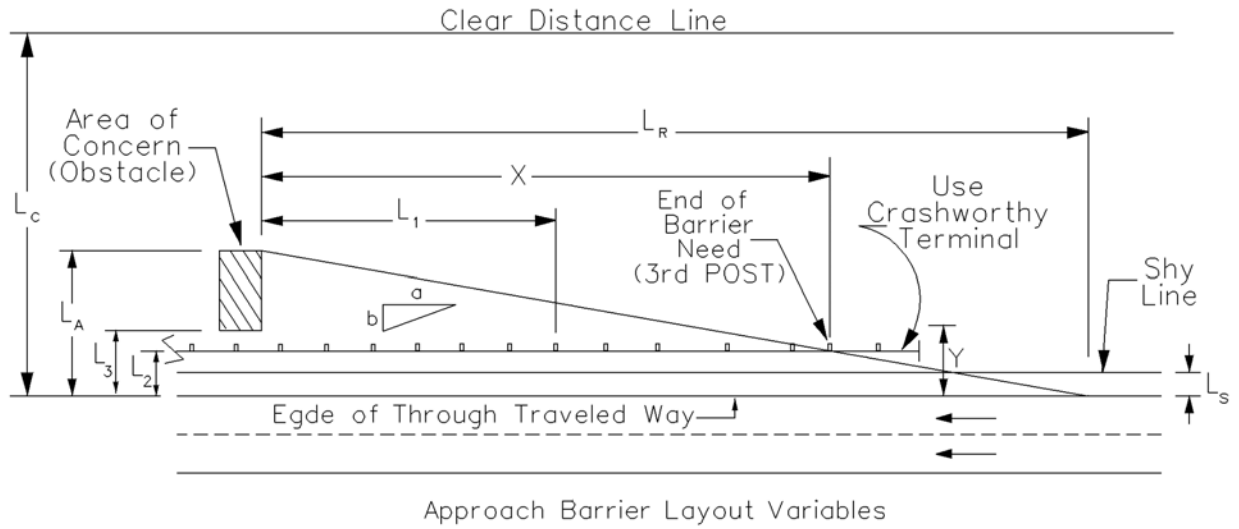


3. Guardrail Length of Need Computations

To compute the length of guardrail needed, determine the length of runout (Lr) from the table on the following sheet and establish this distance from the edge of the hazard to a point of the outside edge of the approaching lane. Draw a line from this point on the outside edge of the hazard within the clear zone or to the edge of the clear zone at the hazard.

The length of guardrail needed from the hazard is the distance from the hazard (normally) to the third post of the end treatment. This may vary depending upon which end treatment is used. The remaining section of rail in the end treatment may be included in the length of rail needed. Add the length of guardrail needed upstream of the hazard for the total length of guardrail. Round off the guardrail length to the next highest multiple of 12.5.

The outside edge of the hazard (La) could be a bridge column, sign footing, tow of the first non-traversable fill slope, top of bank of a crossing stream or other object which is a danger to traffic.



Approach Barrier Layout Variables

Legend:

Lc	Width of clear zone
Lh	Distance to back of hazard
L3	Front edge of hazard
L2	Guardrail offset
Lr	Length of runout (from table)
Ls	Shy line offset (from table)
Y	Offset at end of guardrail
X	Length of guardrail needed form hazard

Runout Lengths for Guardrail Design

	Traffic Volume (ADT)			
	Over 6000	2000-6000	800-2000	Under 800
Design Speed (mph)	Runout Length L_R (ft)	Runout Length L_R (ft)	Runout Length L_R (ft)	Runout Length L_R (ft)
70	480	440	400	360
65	440	400	365	330
60	400	360	330	300
55	360	325	295	270
50	320	290	260	240
45	280	255	230	210
40	240	220	200	180
35	205	190	170	155
30	170	160	140	130

Shy Line Offsets

Design Speed (mph)	Shy Line Offset L_s (feet)
80	12.0
70	10.0
60	8.0
50	6.5
40	5.0
30	3.5

4. Impact Attenuators

Impact Attenuators are designed on a per case bases with a force of 7 g's being the maximum deceleration. They are used to stop or redirect an errant vehicle. Nine bay construction (work) zone portable terminal impact attenuators (crash cushions) are now available for use in areas with speeds up to 70 mph. The nine bay units mentioned above will be required on all interstate projects and any facility with speed limits posted for 65 mph or more. Six bay units may continue to be used on secondary and primary roadways with speed limit postings of 60 mph or lower. Three bay units can be used sparingly on low speed facilities most commonly found in urban areas. The permanent speed limit posted in place before beginning of construction shall be used for determining which units are to be used. A reduction of the speed limit for construction is not a factor in the determination of attenuators due to the lack of observance of the reduction of speed in work zones by the motoring public.

When using a QuadGuard on the end of a Concrete Median Barrier, a concrete back-up is to be specified as shown on Standard Drawing Number 805-18.

When using a QuadGuard on the end of a bridge parapet wall, a tension strut back-up is to be specified. The tension strut allows the QuadGuard to be shifted several inches to better line up with the parapet wall. Transition panels will be used with the tension strut to protect opposing traffic, when necessary. If a bridge approach slab is used, Bridge Design should be advised to widen the slab to accommodate the QuadGuard. If an approach slab is not used, grading for an anchor pad must be done.

5. Type "T" End Treatment

Type "T" End Treatments are a tangential end terminal that does not require an offset. However, it can be offset up to maximum of two (2) feet if constructed of a 25:1 taper over the full length of the terminal.

6. Retaining Wall

SUBJECT: Location of Retaining Walls

REFERENCE: Memorandum for Director of Preconstruction dated 8-1-88

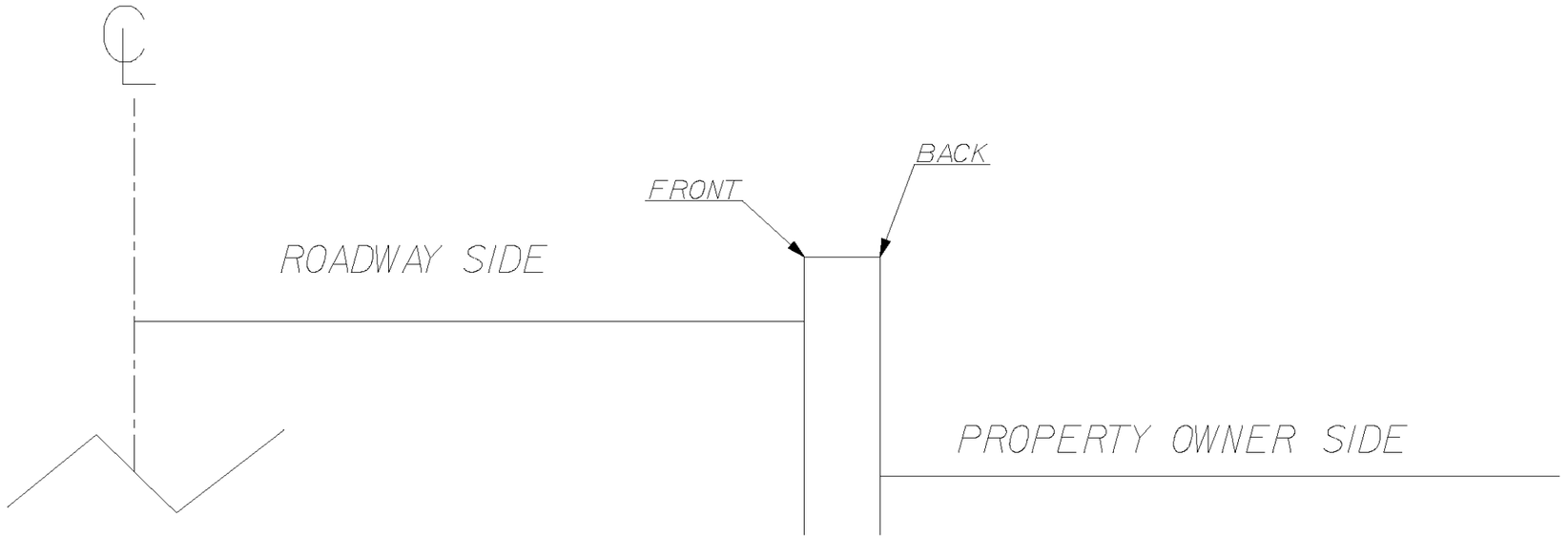
Whenever it becomes necessary for the Department to propose construction of retaining walls to contain cut or fill slopes, the back of the wall shall be established as the right of way. Depending upon design of the wall footing, permission may be required to construct and maintain the footing. If permission cannot be obtained for the footing, sufficient right of way to construct and maintain the wall and footing must be obtained.

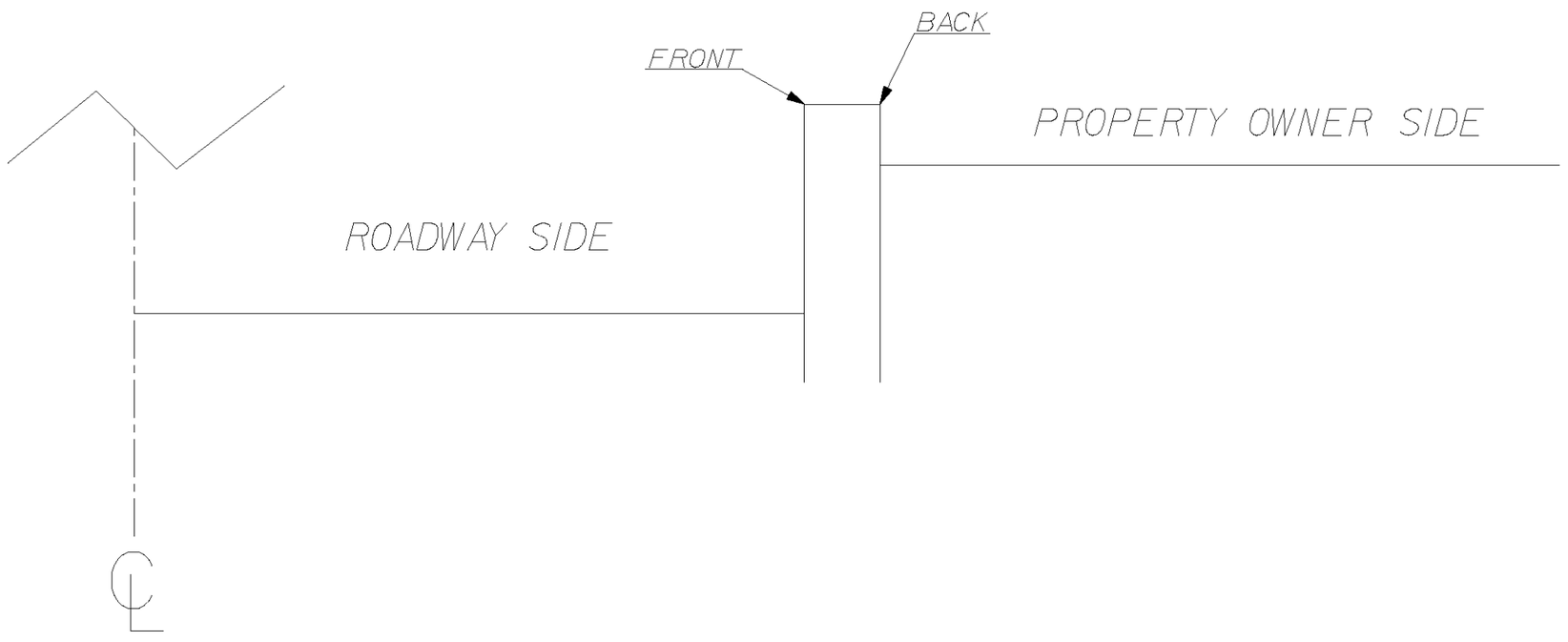
In situations where the landowner negotiates for a wall in lieu of slopes, the right of way shall be established as the front of the wall. The wall shall become the property of the landowner after the Department has accepted the structure from the contractor. The right of way instrument shall reflect that any future maintenance is the responsibility of the property owner.

See detail on following sheet.

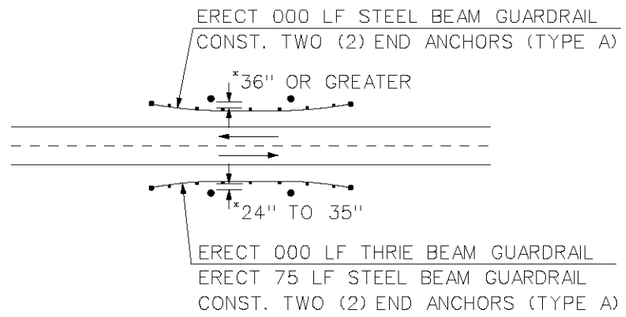
7. Guardrail in Radius

When guardrail is needed at intersecting roads/streets, sharp radii are required. It is possible to bend guardrail to fit a maximum of an eight-foot radius. Radii this sharp should be used only in extreme cases.


BACK
FRONT
ROADWAY SIDE
PROPERTY OWNER SIDE

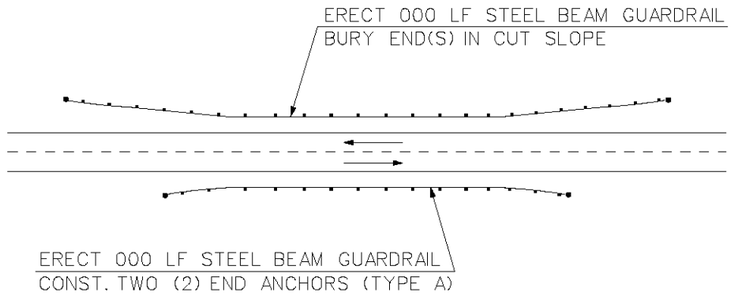

BACK
FRONT
PROPERTY OWNER SIDE
ROADWAY SIDE

METHOD OF PLACING GUARDRAIL ON UNDIVIDED ROADWAYS



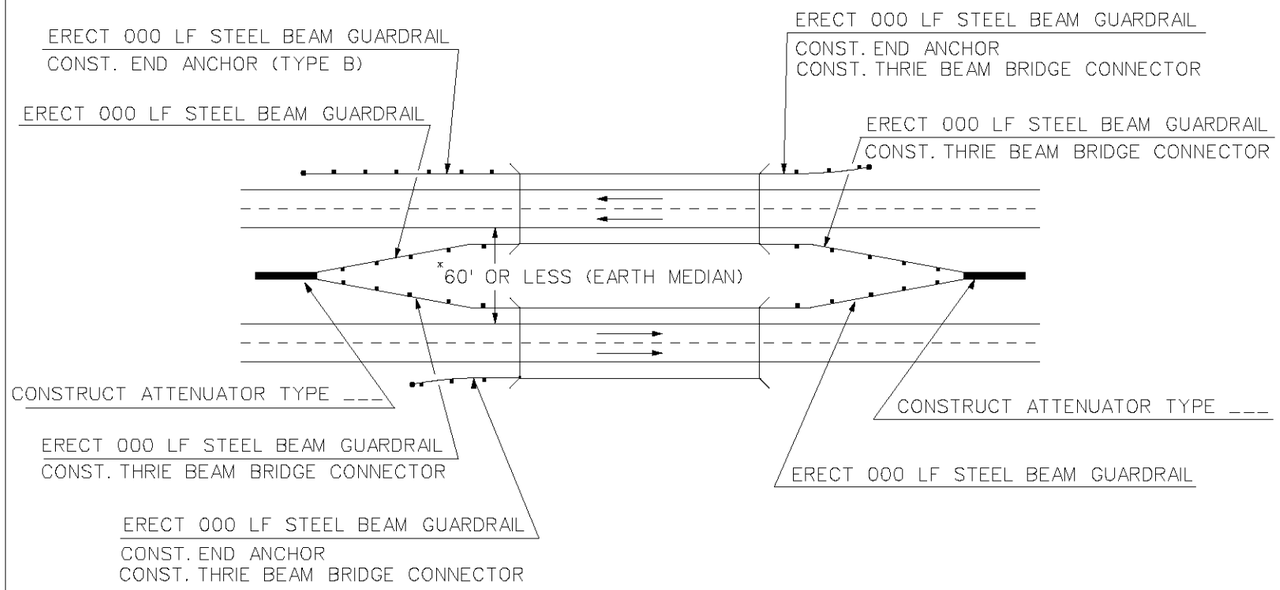
xGUARDRAIL OFFSET DISTANCE IS MEASURED FROM OBSTACLE TO BACK OF POST

GUARDRAIL DETAIL AT ROADSIDE OBSTACLES



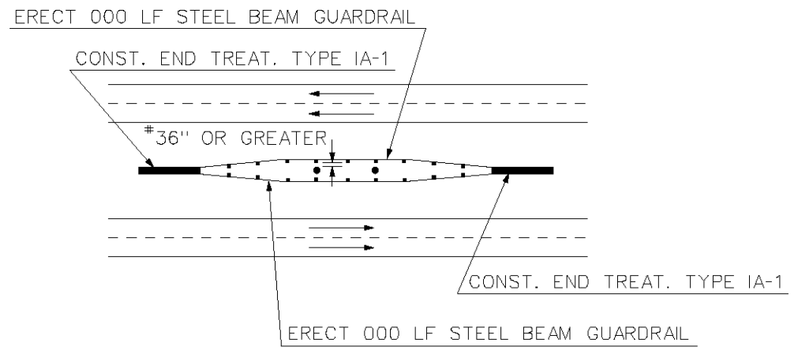
STANDARD GUARDRAIL DETAIL

METHOD OF PLACING GUARDRAIL
ON DIVIDED ROADWAYS
50 MPH OR GREATER



*WHEN MEDIAN WIDTH EXCEEDS 60' TREAT AS SEPARATE ROADWAYS

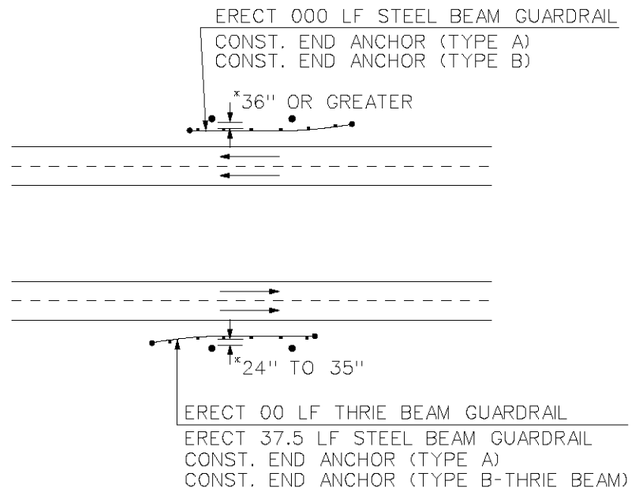
GUARDRAIL DETAIL AT BRIDGES (≥ 50 MPH)



#GUARDRAIL OFFSET DISTANCE IS MEASURED FROM OBSTACLE TO BACK OF POST

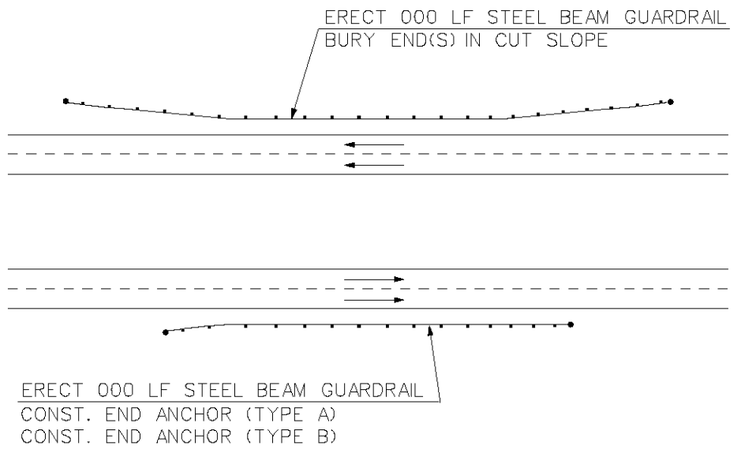
GUARDRAIL DETAIL AT MEDIAN OBSTACLES (≥ 50MPH)

METHOD OF PLACING GUARDRAIL ON DIVIDED ROADWAYS



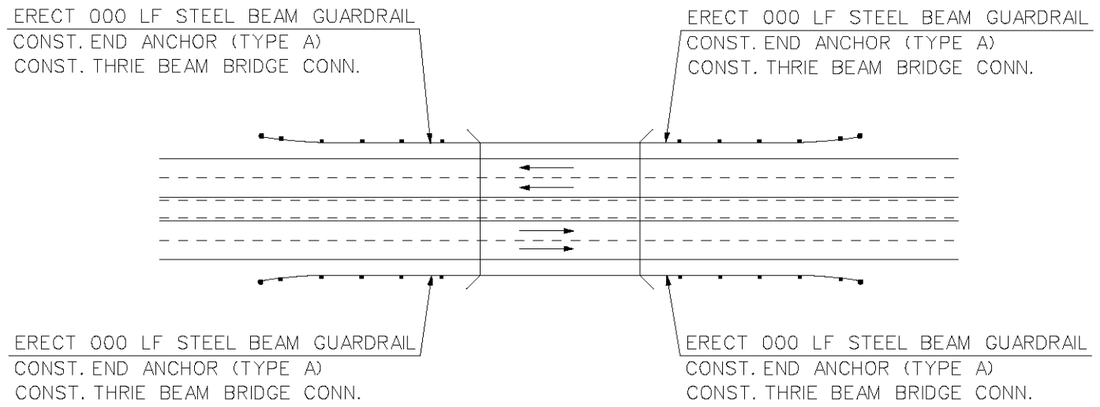
*GUARDRAIL OFFSET DISTANCE IS MEASURED FROM OBSTACLE TO BACK OF POST

GUARDRAIL DETAIL AT ROADSIDE OBSTACLES

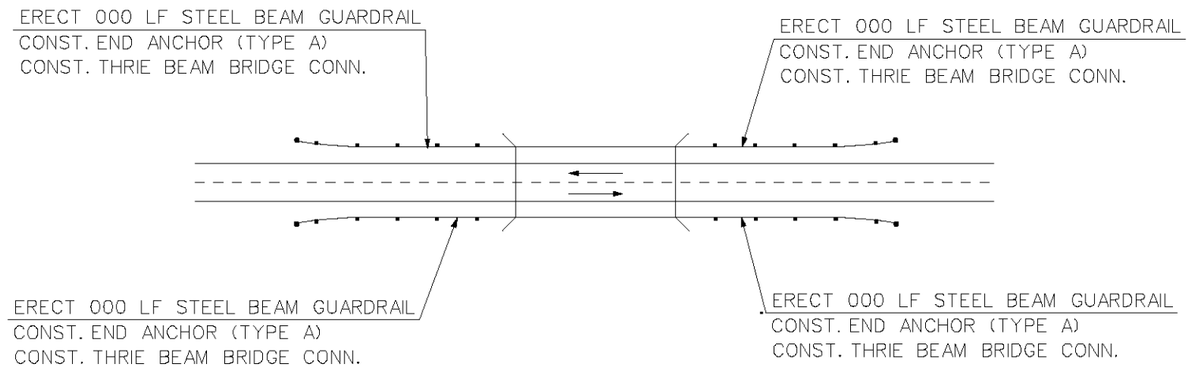


STANDARD GUARDRAIL DETAIL

METHOD OF PLACING GUARDRAIL
ON UNDIVIDED ROADWAYS
(INCLUDES PAVED-PAINTED MEDIAN)



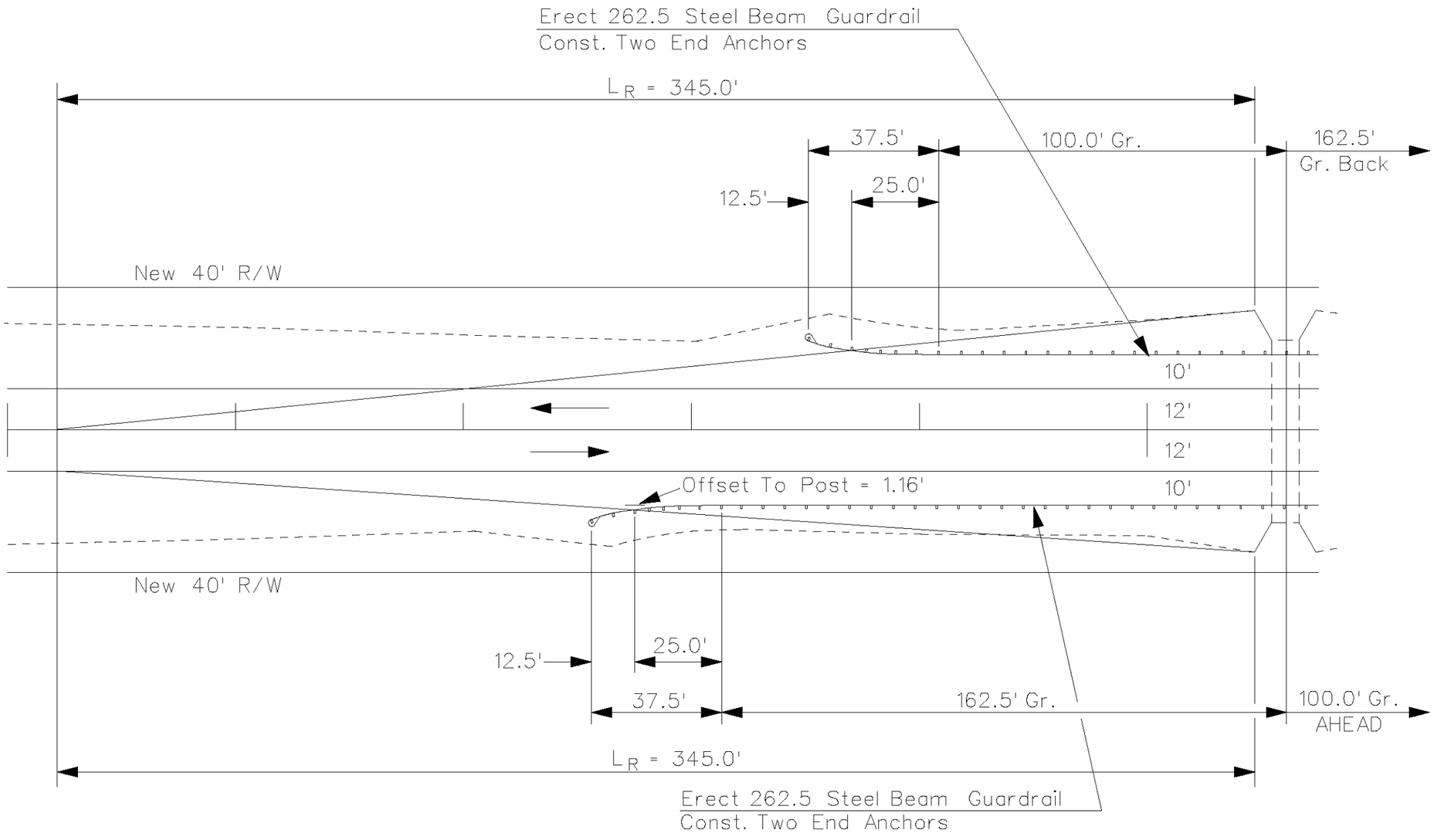
GUARDRAIL DETAIL AT BRIDGES
(FIVE LANE SECTION)



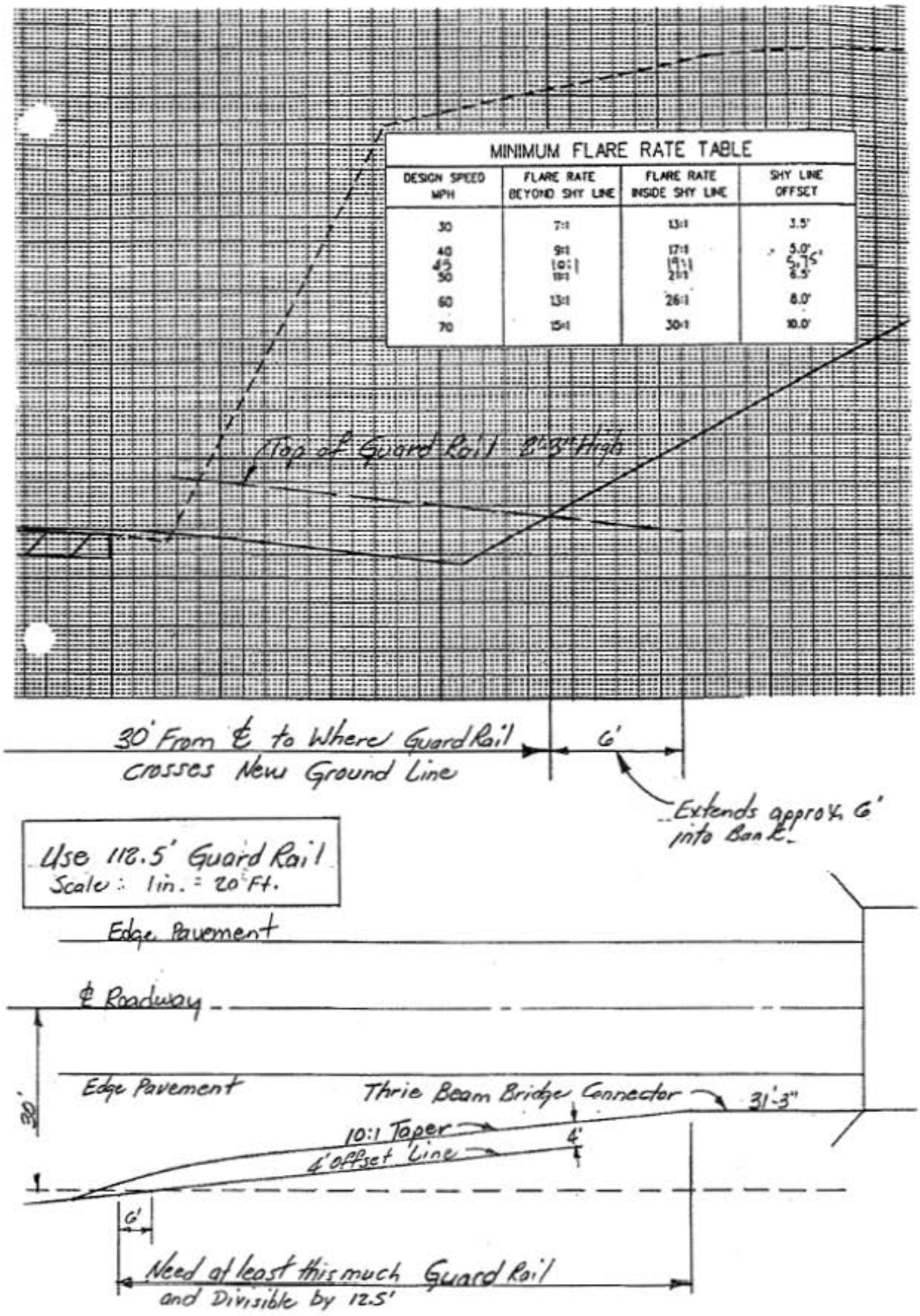
GUARDRAIL DETAIL AT BRIDGES

EXAMPLE OF GUARDRAIL LENGTH OF NEED

DS = 55mph ADT = 3600 SHOULDER WIDTH = 10.0'



Guardrail Length In Multiples Of 12.5' Post Spacing = 6.25'


MINIMUM FLARE RATE TABLE
DESIGN SPEED MPH
FLARE RATE BEYOND SHY LINE
FLARE RATE INSIDE SHY LINE
SHY LINE OFFSET
30
7:1
13:1
3.5'
40
9:1
17:1
5.0'
45
10:1
19:1
5.5'
50
11:1
21:1
6.5'
60
13:1
26:1
8.0'
70
15:1
30:1
10.0'
Top of Guard Rail 8'-3" High
30' From ℄ to Where Guard Rail crosses New Ground Line
6'
Extends approx. 6' into Bank
Use 112.5' Guard Rail
Scale: 1in. = 20' Ft.
Edge Pavement
℄ Roadway
Edge Pavement
30'
Thrie Beam Bridge Connector
31'-3"
10:1 Taper
4'offset Line
4'
6'
Need at least this much Guard Rail and Divisible by 12.5'

Plan Preparation Guide

Chapter 11

Cross Sections

1. Existing Cross Sections

Cross Section data files are sent to the appropriate directory for each Design Group on Smpserv 3. The highway cross section is a view of the transverse section of a roadway.

Cross Section sheets are reference files that already have the scale on them. You will need to use the appropriate sheet found in G:/rd_std or G:/met_std according to which scale you plot your cross sections. Cross sections are generated from a tin file created by the CADD user. (See CADD Users Guide).

Cross Sections are usually taken at increments of every 50 feet along horizontal curves, 100 feet along tangent sections, and other points where there is a radical change in terrain or edge of pavements. For secondary projects, cross sections are usually plotted two columns on the sheets, approximately 3" to 4" apart. This will allow approximately 5 to 6 cross sections in each column. Where it is anticipated that there will be deep cuts or fills, it may be necessary to space cross sections further apart. These cross sections should be plotted on a scale of 1" = 5' both vertical and horizontal. On major or primary projects, usually, cross sections are taken 75' to 100' left and right of the centerline. This will make it necessary to place cross sections up the center of the page. Also, if cross sections go out more than 75′ each side it will be necessary to change the scale to 1″ = 5′ vertical and 1″ = 10′ horizontal. Scale should be shown in lower right hand corner in 1″ square block, one 1″ square block from the bottom of the page and one 1″ square block from the right edge of the paper by drawing a diagonal line from corner to corner of the 1″ square block. Then show the proper scale along vertical and horizontal line.

The designated station number should be shown horizontal approximately 1″ below the cross section on the centerline. The existing ground line elevation should be shown vertically on the centerline approximately ½″ to 1″ above the cross section with the finished grade elevation shown vertically one line below the existing ground line elevation. The end area will be shown horizontal on the 10′ line (1″ = 5′ scale) or 20′ line (1″ = 10′ scale) with the cut shown on the left and the fill on the right. This will be shown at the same level as the station number. The volume should be shown vertically on the 15′ line (1″ = 5′ scale) or 30′ line (1″ = 10′ scale) and placed between the stations. The volume for the first cross section on the first page should be shown below that cross section and volumes for the first cross section on the following pages will be shown at the top of the preceding page. Volumes are also accepted using the GEOPAK format.

All dimensioning for station, existing elevation, proposed elevation are controlled within the criteria file used to layout the cross sections on sheets. Existing ground lines on cross sections and profiles will be shown with a dashed line. When existing base and surfacing is in place, diagonal lines will be shown under existing base and surfacing.

Cross Sections can be plotted at any given point by using Tin Files in GEOPAK.

2. Proposed New Construction

A beginning note shall be shown under the first cross section and the ending note shall be shown after the last cross section. An example of the beginning note is:

Survey Sta. 0+10.0 Begin
File 40.168 – Road S-1028

Berm and swale ditches should show a note at the beginning of each ditch. Example:

Construct swale ditch Lt. Sta. 1+25.0 to Sta. 7+50.0

These ditches must have a grade and elevation of ditch and should be shown above each section on the front edge line of the ditch. Special ditches 300′ or longer require a note, grade and elevations as described for swale and berm ditches. Front ditch slopes may be steepened or extended further out to obtain positive drainage without grades and elevations when less than 300′ in length.

Show a note for Begin and End superelevation and Begin and End Maximum superelevation.

Note on 1st sheet of cross section (C&G) – Cross slope may vary due to minor adjustments to top of curb elevation.

Use CADD Users Guide and appropriate levels, weights, etc. for existing and proposed cross sections.

The proposed template should reflect the desired roadway cross section of the appropriate station. The designer must show pavement breaks, shoulder breaks, front slopes, back slopes and ditches. Identify all slopes beyond the shoulder that are non-standard (varies from the typical section). It is also necessary to show the bottom of the subgrade and proposed curbs, gutters, sidewalks, retaining walls, and major drainage structures.

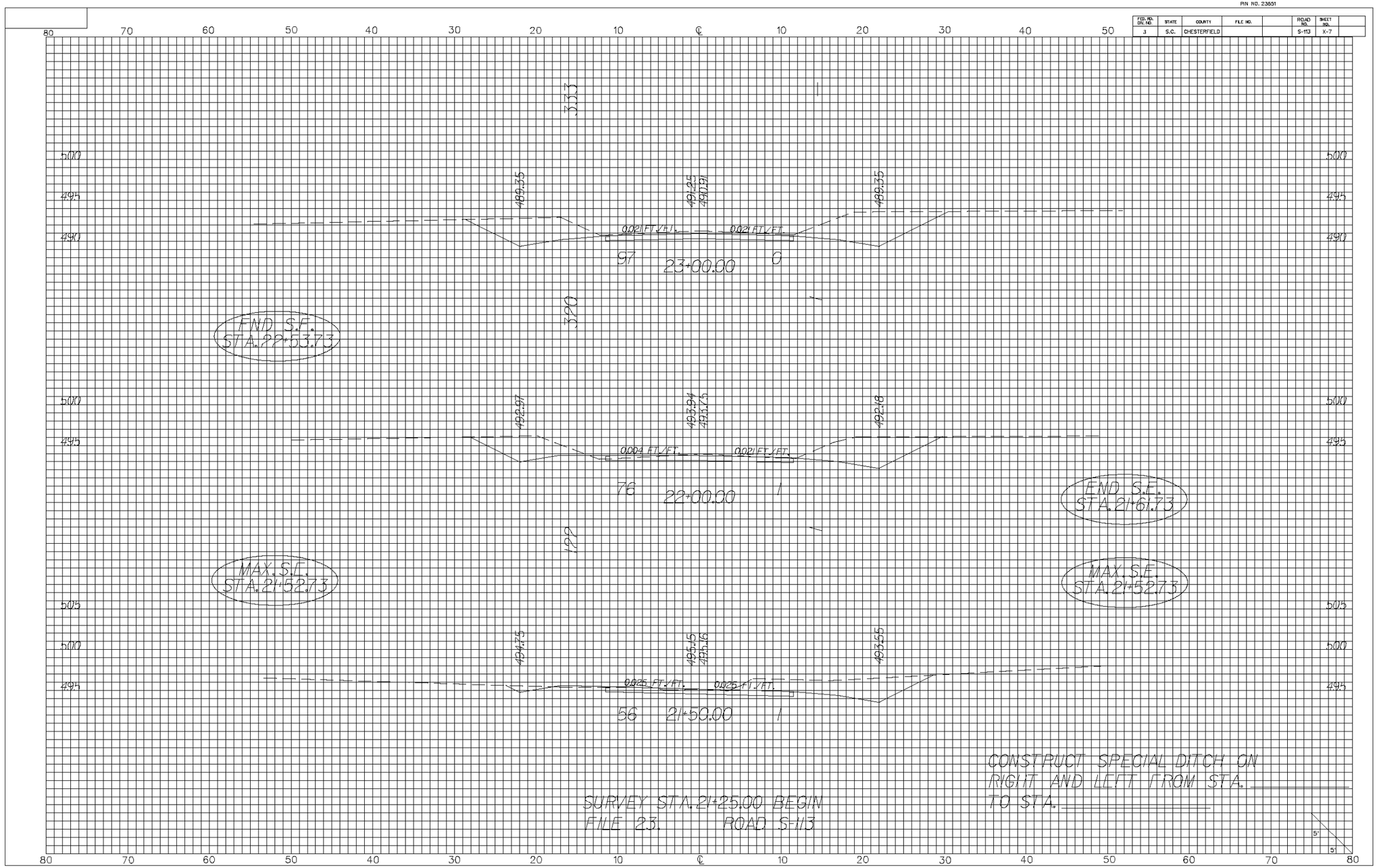
Each project should be thoroughly reviewed to insure positive drainage, that templates and existing ground lines are plotted at the correct elevation, and that templates are plotted accurately according to the Typical Sections.

Cross sections and templates are very important and should be plotted as neatly and accurately as possible.

See the following sheet for cross section examples.

P.I.N. NO. 23551

FED. RD. DIV. NO.	STATE	COUNTY	FILE NO.		ROAD NO.	SHEET NO.	
3	S.C.	CHESTERFIELD			S-113	X-7	



Plan Preparation Guide

Chapter 12

New Right-of-Way

1. General Right-of-Way Information

Highway plans are used by right-of-way personnel in the preparation of instruments of record. They are also used as references by appraisers, planners, surveyors and property owners. The designer must keep in mind consistent application of rules and policies when establishing and depicting right-of-way and related data on the plans.

The Department may acquire an easement or fee simple title to real property by gift, purchase, or condemnation for the construction, maintenance and improvement (or safe operation) of highways in this state. The acquisition of right-of-way, whether in easement or fee simple title, is dictated by both federal and state law.

New right-of-way boundaries should represent the limits of usable area required for construction, maintenance activities following construction, space for placement of utilities and traffic control devices.

In rural areas ditch and channel cleaning, shoulder repairs, mowing, etc. are more easily accomplished within an adequate working area. Wide right-of-way contributes toward adequate clear zones, particularly, to provide sufficient sight distance at intersections and around curves. The new right-of-way limits should be adjusted for uniformity and to eliminate transition lines as much as possible and thus achieve a uniform offset from the survey centerline for extended lengths. Consideration may be given to tighter limit as significant conflicts dictate.

It is important that the total area be as generous as possible, keeping in mind the economic impacts to the overall project cost and the benefits derived. These considerations are generally not applicable in urban areas due to high property cost and the maintenance of grounds adjacent to, and often within, the right-of-way being performed by the property owners.

Occasionally, it is necessary to send prints to Right of Way before the plans are ready in order to begin preliminary right of way investigation. These prints only need to be sent when requested and should only be requested to meet funding obligations.

The Right-of-Way Section should be sent one small set of plans when the right-of-way information is limited to the property owner and total acreage. Plans that have property owners, total acreage, and obtain computed will have one small and two large sent to Right-of-Way. Do not send plans that do not have at least the property owners and total acreage shown.

Do not send cross sections with preliminary plans to Right-of Way unless requested.

The design group will obtain the copies and send the preliminary prints to Right-of-Way. Please enter the date they are sent into PPMS (Screen 40) under the design group comments section only. Do not place a date in “Plans to R/W”.

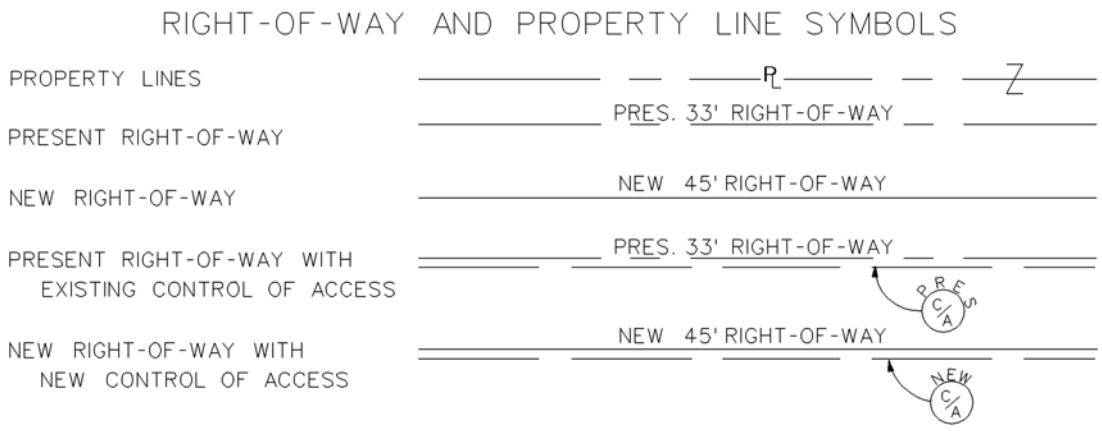
2. Setting New Right-of-Way (Secondary Projects)

When preliminary Road Design plan drawing are complete the proposed new right-of-way should be added to the plans on CADD level 33.

Right-of-Way should be set according to construction slopes on a case-by-case basis.

Any request for exception to the minimum right-of-way widths must be approved by the Program Manager.

It is desirable to establish a uniform width and apply it throughout the project. Work required outside the uniform width may be accomplished by obtaining a property owner's permission. (See Page 12-11) The flow area of roadway ditches should be within the right-of-way to avoid future maintenance problems.



3. Setting New Right-of-Way (Primary and Major Secondary)

When preliminary road design plan drawings are complete, a field review may be called for by the Group Coordinator. In these cases, the plans may only show the existing R/W.

After consulting the project planning report, completing the vertical and horizontal design on the plans, and plotting the templates on cross sections the construction limits may be shown.

Delineation of accurate construction limits on the drawings is critical to the establishment of new right-of-way boundaries. Right-of-way plans should show the construction limits in the plan view at each cross section location. Carefully review areas not covered by cross section to assure that the limits of construction represent the actual conditions expected during construction.

The construction limit points shall be measured from the cross sections and linked by connecting dashed lines. Points on the limit lines should be labeled with a distance from the centerline and "C" or "F" to denote cuts or fills. Construction limits adjacent to interchange ramps, loops, flyovers, cross roads and parallel drainage courses are to be shown. In special cases, it may be desirable to show dual construction limits for clarification purposes. (See Figure 12-A)

NPDES

Additional areas to be cleared for NPDES will be shown on the plans when outside the construction lines. A special line denoting the additional area needed to accommodate items of work to meet the NPDES requirements should be placed on the plans only when necessary to go beyond the cut/fill slope line (construction line). This special line can be found in the custom line style palette and is shown here:

--NPDES------NPDES------NPDES--

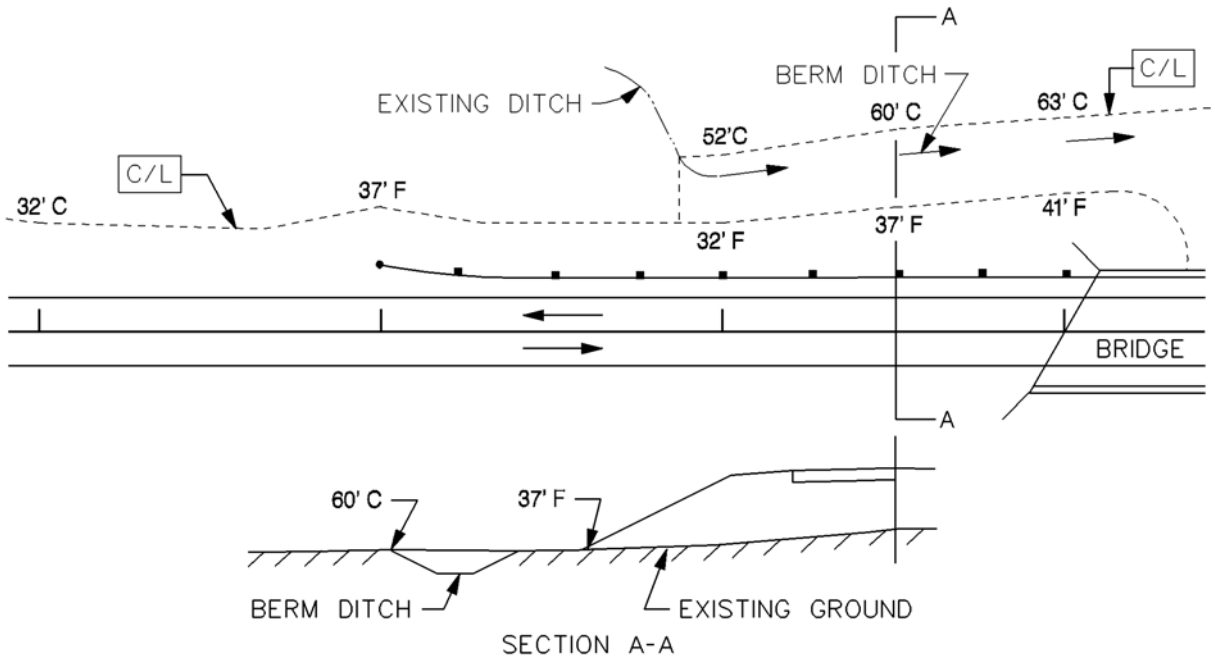
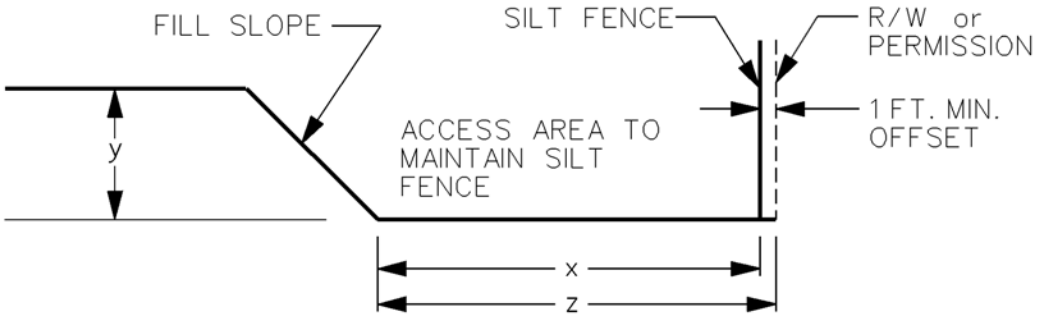


FIGURE 12-A METHOD OF SHOWING CONSTRUCTION LIMITS

NPDES Area

All fill slopes requires silt fence in order to minimize the erosion of sediment off the project site. Silt fences should be placed at or near the toe of the fill slope as prescribed in the following chart.

HEIGHT OF FILL (y) IN FEET	FILL SLOPE	MINIMUM SILT FENCE OFFSET FROM TOE OF SLOPE (x) IN FEET	MINIMUM RIGHT OF WAY OFFSET FROM TOE OF SLOPE (z) IN FEET
<6	2:1 4:1 6:1	2	3
6-10	2:1	12	13
	4:1 6:1	3	4
>10	2:1	12	13
	4:1 6:1	4	5



An area behind the silt fence is needed to properly maintain the silt fence. Large equipment and trucks will use the area behind the silt fence to remove and dispose of any sediment collected by the silt fence or a nearby silt basin. When this area behind the silt fence cannot be obtained, the maintenance of the silt fence will be handled in the best manner possible during construction. Right of way needed to meet NPDES requirements may be by permission or permanent right of way or a combination of both.

Right of way limits in cut slope areas should be determined during the Field Review where interceptor ditches or other erosion control items are deemed necessary.

The right of way line should maintain a uniform alignment for a minimum of 300 linear feet and not fluctuate in and out, when possible. Discretion by the designer should be given when establishing right of way boundaries in order to minimize areas not needed for the construction and maintenance of the project.

COORDINATION OF HYDROLOGY/NPDES STUDIES WITH RIGHT OF WAY

It is always preferable to have the complete final hydrology and NPDES shown on the plans for right of way acquisition. When the final hydraulic/NPDES designs are not available to be placed on the right of way plans, every effort should be made to include on the right of way plans all hydraulic/NPDES designs that effect right of way. However, when right of way plans have been sent to Right of Way Section prior to receiving the final hydrology and NPDES studies, revisions to the plans especially to the existing hydrology and erosion control elements can be expected. Upon receipt of the final hydrology and NPDES from the Hydrology Section, Road Design will make the necessary revisions, noting appropriately on each sheet where the following revisions are made: "Revisions made in accordance with the hydrology and/or NPDES studies dated_____ (Project Manager initials and date)".

Road Design will forward to Right of Way the revised sheets. If parcels, that have already been obtained or permission received, are affected by the hydrology/NPDES revisions, then Right of Way Section should contact Hydrology and Road Design to try to work out those differences before revisiting the property owner.

4. Right of Way Widths

Determining the width of the permanent right of way is primarily a function of the typical section and drainage requirements for a section of roadway. Although these are the prevailing criterion to set right of way, an additional criteria has emerged in the past few years which is based on the requirements of the National Pollutant Discharge Elimination System (NPDES)

Desirably, the new right of way line should be established sufficiently beyond the construction lines (10 to 15 feet) to permit maintenance equipment to work outside of and parallel to the construction limits, particularly for freeways, expressways or other major highways. In urban and suburban areas, this is usually not practical due to the high cost of property. In congested urban areas, the right of way line is set a minimum of one (1) foot from the back edge of the sidewalk and permission is obtained for slopes that extend beyond these limits. The new right of way limit should be evaluated during the Field Review.

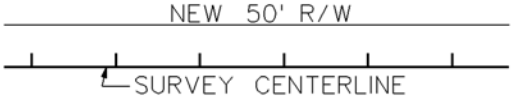
Through a discussion with Highway Projects and Right of Way, it is expected that permanent right of way will be used, in general, around both, temporary and permanent sediment control basins. It has also been determined that for areas needed for items that run longitudinally with the center line, such as silt fence; those areas will be shown with an "NPDES line" only when outside of existing construction (slope) lines. Right of Way lines will not be determined by these longitudinal NPDES items that effect adjacent properties. When the "NPDES line" runs outside of the right of way line, this area will be obtained as permission. If the property owner will not sign for this permission, the "NPDES line" should be re-evaluated prior to converting the area to permanent right of way and condemning.

Permanent right of way should be set primarily to provide the area needed for the project's permanent features that will be permanently maintained by the Department.

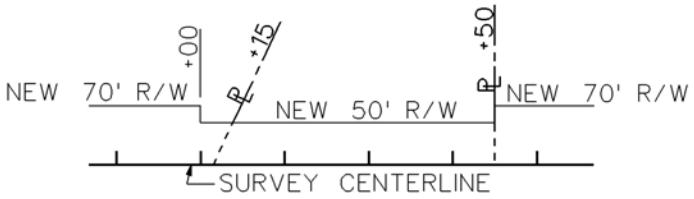
When additional right of way is more difficult to obtain due to high cost, urban areas, wetlands, and/or significant trees, all means shall be taken to circumvent such conflicts by minimizing the additional right of way and still allow implementation and maintenance of necessary erosion control facilities.

When it is necessary to have breaks in the right of way, and the location is near a property line, the designer shall not elect to utilize the property line as a break.

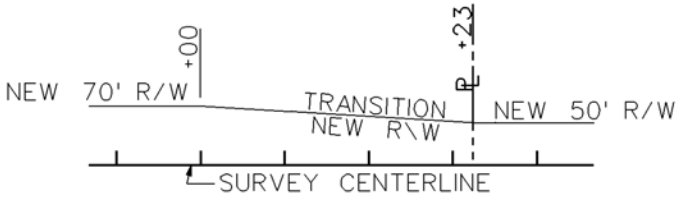
METHODS OF ESTABLISHING NEW RIGHTS-OF-WAY



METHOD 1: A UNIFORM WIDTH FOR THE ENTIRE PROJECT.
EXCESS CONSTRUCTION AREA REQUIREMENTS OBTAINED THROUGH CONSTRUCTION OR SLOPE EASEMENTS.



METHOD 2: A UNIFORM WIDTH WITH ADDITIONAL RIGHT-OF-WAY AS NECESSARY.
ACQUIRE EXTRA RIGHT-OF-WAY AS REQUIRED FOR CONSTRUCTION AT 90° ANGLES TO THE CENTERLINE.



METHOD 3: PARALLEL PROJECT CONSTRUCTION LIMITS.
USE A UNIFORM WIDTH WHERE FEASIBLE AND THEN GENERALLY PARALLEL CONSTRUCTION LIMITS WHERE WIDER OR NARROWER WIDTHS ARE REQUIRED.

FIGURE 12-B RIGHT-OF-WAY ALTERNATIVES

5. Illustrating New Right of Way on Plans

New right of way shall be clearly identified near the beginning and end of each plan sheet and at any other points where the continuity is broken.

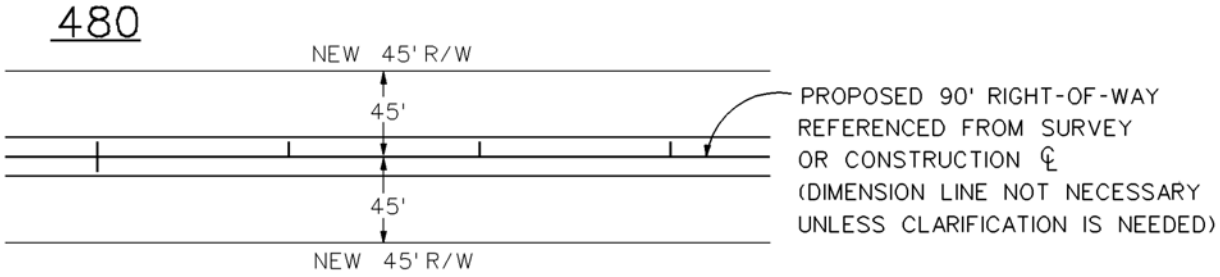


FIGURE 12-C

In cases where the new right of way does not parallel the proposed centerline, the new lines shall be denoted as **New Transition R/W.**

When referencing new right of way along a facility having grade separation interchanges, the new Right of Way shall follow and be referenced from the ramp survey line. Dual referencing is required at the point where the ramp departs from the mainline.

Example: 125' NEW R/W MAINLINE STA. 205+00=
89' NEW R/W LINE "A" STA. 205+00

The designer should provide a double station and offset when a break in new right of way occurs at a point where the reference is changing from one centerline to another.

To utilize portions of present right of way for the new right of way, if both lines are parallel to the proposed alignment, the line should be denoted as PRES. 50' R/W = NEW 70' R/W.

In cases where the present and new right of way are on common tangent alignment and **do not** parallel the proposed alignment, the line shall be denoted as PRES. R/W = TRANSITION NEW R/W. The beginning and end of transitions should be shown on plans by station and offset.

To utilize an existing portion of present right of way on a curved, alignment as the new right of way line:

- Select the portion of present right of way to be retained
- Show beginning and ending stations and offsets
- Show curve data for present curved right of way on plans
- For example see Figure 12-D

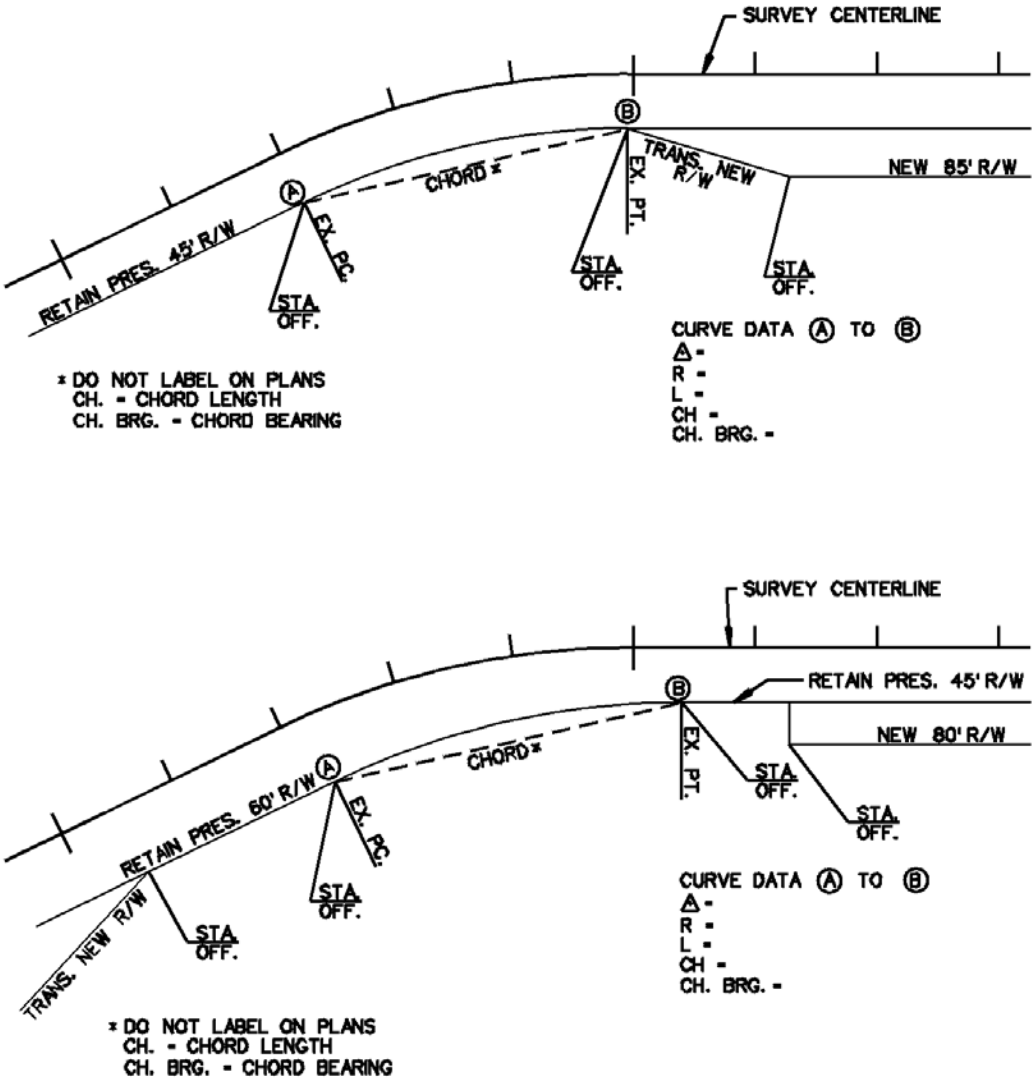


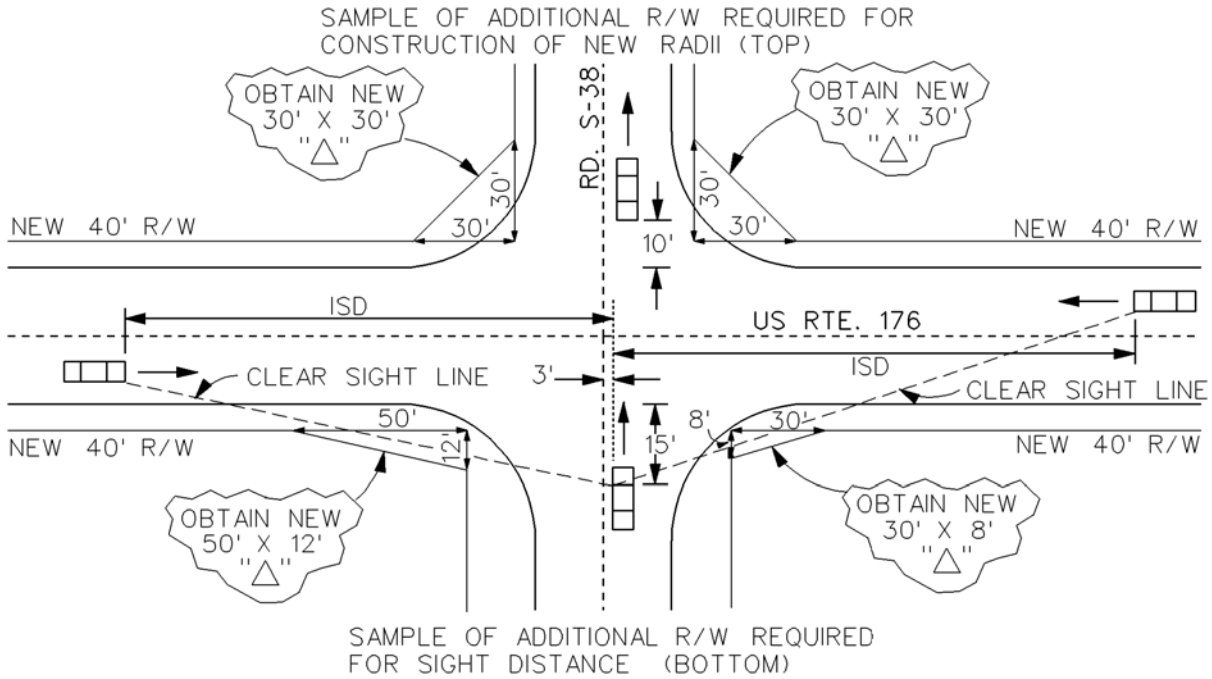
FIGURE 12-D METHOD FOR SHOWING EXISTING CURVED RIGHT-OF-WAY TO BE RETAINED

6. Triangular Areas

These areas are normal right of way acquired for construction purposes as well as sight distance control. For "At Grade Intersections" the designer needs to check all quadrants for sight distance requirements to assure sufficient line of sight area is available, and can be perpetually protected from obstructions.

Once the required triangular area is determined, it shall be clearly shown on the right of way plans and covered by a note that indicates the additional area required.

When consideration is given to triangular areas at intersections be aware of proper shoulder width, ditch construction around the radius, and placement of pipe or structures that may require extra right of way.



NOTE FOR LABELING TRIANGULAR AREAS: LIST THE MAIN ROAD DIMENSION FIRST
LIST THE SIDE ROAD DIMENSION SECOND
SURROUND THE NOTE VIA A "CLOUDED" NOTATION

FOR INTERSECTION SIGHT DISTANCE (ISD) SEE CHAPTER 6.2.4 OF THE SCDOT HIGHWAY DESIGN MANUAL

FIGURE 12-E TRIANGULAR AREAS AT INTERSECTING ROADS

7. Right of Way on Sharp Horizontal Curves

Horizontal sight restrictions may be caused by retaining walls, cut slopes, trees, buildings, etc. on the inside of curves. A height of 2 feet can be used as the midpoint of the sight line where the cut slope usually obstructs sight. If the obstruction is outside of the right of way, consideration of obtaining the additional right of way may be merited on new construction projects. For reconstruction projects, the cost of right of way acquisition to clear obstructions should be weighed against the severity of the obstruction problem.

See tables 6-6, 6-7 and 6-8 in the SCDOT Highway Design Manual.

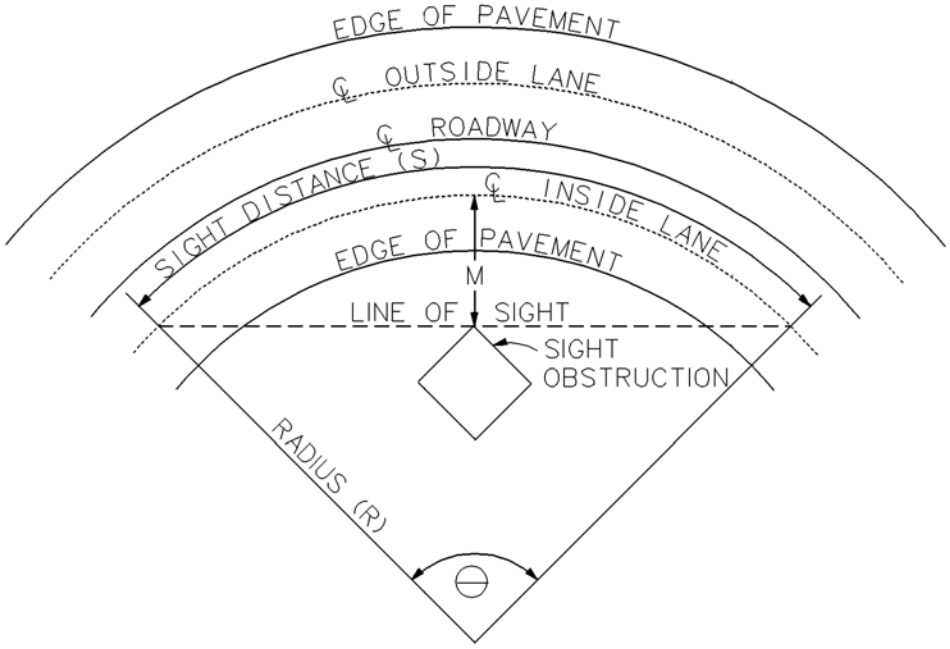


FIGURE 12-F SIGHT DISTANCE ON HORIZONTAL CURVES

8. Outfall Ditches

Outfall ditches require either right of way be acquired or permission to construct or clean be obtained from the land owner. Right of way should be acquired to construct an outfall ditch to provide positive drainage where no natural drainage exists. Right of way is generally obtained on all federal aid projects, and other projects, where ditches are determined to be necessary for the overall function of the drainage system and protection of the roadway. New right of way should be of sufficient width to provide for construction activities and future maintenance. 30 feet total width, with 10 feet on one side and 20 feet on the other, has been generally accepted unless the circumstances dictate other widths be used. When the Project Engineer request a specific length outfall be obtained, it should be measured from the mainline right of way.

9. Channel Changes

These relocations of streambeds may be parallel to or crossing the project. New right of way should cover their construction and future maintenance requirements.

10. Culvert Sites

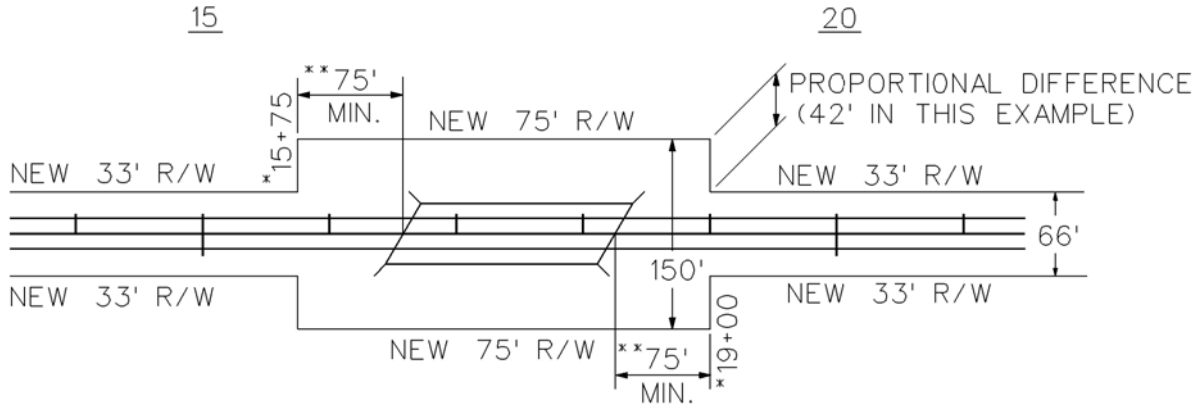
A minimum space of ten (10) feet will be provided between the wing wall ends of box culverts and the present or new right of way. Additional right of way will be provided as required at each site, to encompass permanent erosion control devices (such as energy dissipators, paved liners, scour protection devices, etc.) placed at the ends of box culverts.

11. Bridge Locations

In general, a minimum right of way of 75 feet each side of the structure centerline to a point 75 feet from each end of the bridge is required on all projects having a single two-lane bridge. Where multilane or divided highway structures are proposed, the "proportional differences" (See Figure 12-G), between the existing or proposed roadway approach right of way and the additional right of way required for bridges should be established.

Care should be taken at the point which the extra bridge right of way turns 90 degrees and intersects the approach roadway right of way. When additional embankment is placed for guardrail, the slopes can cut off access around the bridge ends for maintenance forces. A transitioned right of way may be appropriate in these situations.

If present right of way exists to adequately cover the structure and any appurtenances, no new right of way will be required. The minimum right of way shown in Figure 12-G shall be obtained if the project has no additional right of way at bridges.



*SHOULD BE TO NEAREST EVEN STATION OR 25' INTERVAL BEYOND 75'

**ADJUST THE LENGTH AS REQUIRED TO PRECLUDE CUTTING OFF ACCESS TO UNDERSIDE OF BRIDGE BY THE TOE OF FILL OR INSTALLATION OF GUARDRAIL

FIGURE 12-G RIGHT-OF-WAY AT BRIDGE SITES

12. Retaining Walls

See Chapter 10, Pages 8and 9 for a description of right of way at wall locations.

13. Temporary Right of Way

Temporary Right-of-Way is not to be used.

14. Property Closure

All projects, except secondary ('C') projects, non-surveyed projects, and bridge projects, shall have all affected properties numbered and closed. Greenville County is the exception to this rule. Secondary ('C') projects in Greenville County shall also be closed.

If and when, condemnation is required on non-surveyed and bridge projects, a survey request must be made for the affected properties. This should be requested at the earliest time possible.

Property closures may be accomplished by a property layout showing survey centerline and the new right of way. All property lines, including present right of way and distances, will be shown if provided by surveys.

When right of way plans are complete, all plats, deeds, tax maps, etc. used by Road Design in the preparation of plans, will be forwarded to the Right of Way Office by the Road Design Operations Center. These will be retained by the Right of Way departments. If a revision of property is required, the proper information must be returned by the Right of Way office.

15. Control of Access/Limited Access

The project planning report should identify the type of control proposed for each project. Full control of access for all freeways and some other major routes. Other routes may be designed using limited or partial control of access.

"Controlled Access" or "Limited Access" should be clearly denoted on the plan drawings. (See symbols on page 12-2) Any proposed breaks in the controlled access, other than access points at interchanges and sometimes at intersections, shall be clearly identified on the right of way plans in the following suggested manner:

BEGIN AND ENDING STATION FOR CONTROL OF ACCESS

EXAMPLE:
Begin C/A Sta. 11+40
End C/A Sta. 12+40

This break in access will also be recorded on the right of way instrument of record.

Projects that allow vehicular access to the main facility, via at grade intersections, are considered "Limited Access". The control of access line will turn away from the main facility and follow the side road right of way a distance of approximately 250 feet. This distance may be adjusted to accommodate property access along the side road. See Figure 12-H on the following page.

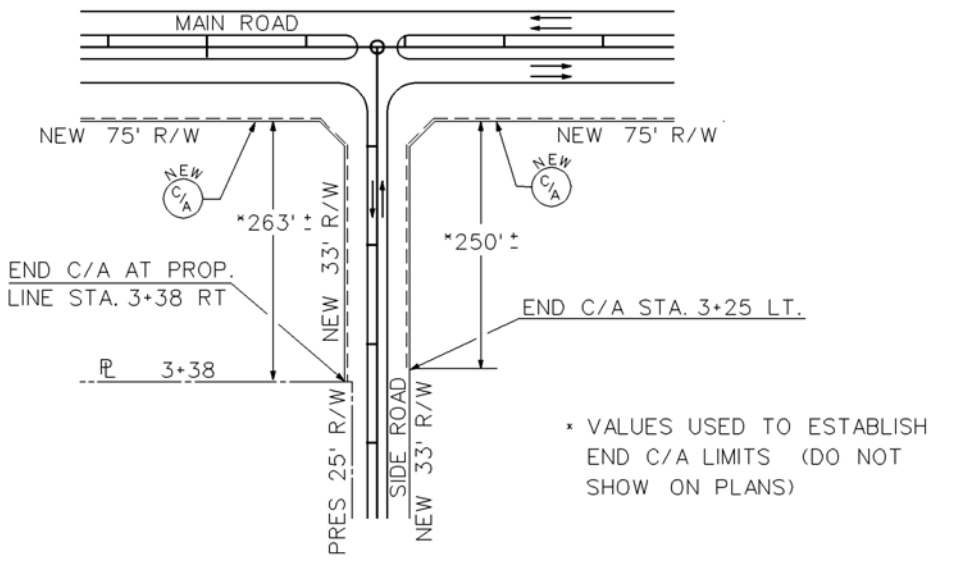


FIGURE 12-H CONTROL OF ACCESS AT INTERSECTION ROADS

16. Placement of Right-of-Way Markers

Right-of-way markers should be utilized only on facilities having control of access and other rural primary facilities. See Standard Drawing No. 809-1 for construction and installation details. Markers should be installed in accordance with the following criteria:

(a) Break points in the R/W line (s)
(b) Points on R/W opposite proposed curvature points of control, i.e. PC/PT
(c) Points along R/W which maintain forward and back line of sight
(d) Maximum distance between any two markers along a continuous R/W line should be 1400' on Tangents and 700' on Curves in Rural Areas and 500' on Tangents and Curves in Urban Areas.

Ideally, right-of-way markers should not be placed at points that are common to property lines and/or corners.

17. Property Information

Early in the plan development, parcel numbers should be assigned to the individual properties, consecutively in the direction of the stationing and listed on the Right-of-Way Data Sheet. Property ownership may change during the development of the project but the pre-assigned parcel numbers will not change. Additional properties may be affected by adding work or realignment to the project. In these cases, new whole numbers should be assigned consecutively from the last whole number used. Should a pre-numbered property be divided or sub-divided, the new parcels should be identified by using the original whole number followed by a letter suffix (i.e., 12-A; 12-B; 12-C; etc.). Should a previously numbered parcel be deleted, the notation "OMITTED" may be entered under the column of the sheet showing the property owner's name.

All projects that require new Right-of-Way, slope permission, control of access, or any type ingress or egress will be required to have each property being affected assigned a tract number.

These tract numbers are the only identification to be shown on plan sheets and property closure layouts.

Any other pertinent information, including property owner and tract number will be shown on the Right-of-Way Data Sheet.

Items to show on the Right-of-Way Data Sheet:

(a) Tract number
(b) Name, as it appears on instrument of record
(c) Tax Map reference
(d) Total area in acres or square feet as referenced on instrument of record
(e) Obtain, shown in acres and square feet
(f) Remainder in acres or square feet if less than ¼ acre
(g) Date of acquisition shown by R/W Department
(h) Type of instrument shown by R/W Department
(i) Construction permission

When a parcel of land is severed, areas remaining left and right of the mainline shall be indicated on the right-of-way plans via a summation of the total areas.

Access to remaining areas should be analyzed, and where uneconomical remnants of property remain, they should be included in the new right-of-way limits. These analyses should be included in the new right-of-way limits. These analyses should be made by the Right-of-Way Section.

18. Right-of-Way Plans Distribution

The distribution of plans to Right-of-Way and other sections or agencies is handled through the Road Design Staff Coordinator.

When right-of-way revisions are necessary during the development of the final plans, notify the Right-of-Way Section immediately. Furnish new plans and revisions in accordance with Chapter 20, Table 20-4, of SCDOT Highway Design Manual. Revisions should be noted near the upper right corner of the Plan and Profile Sheet (or in a revision box when provided), giving the date, initials or person making the change, brief description and location of revision. A revision sheet is created and kept in a file folder by the group coordinator. Make sure that any revision affecting other features of the project (such as utilities, wetlands, traffic control, etc.) is printed and distributed to the respective section.

19. Railroad R/W

It has become very difficult to verify railroad right of way (R/W) widths for the right of way/construction plans. Records of CSX Railroad R/W have been given to a consultant and are not readily available to the Department.

When any railroads are encountered and railroad R/W is present, the railroad R/W shall be shown on plans from the information that is received in the location survey. This information may be obtained from property plats, old plans, and/or tax maps.

After R/W plans have been sent to the Right of Way Section, the plans will also be provided to the Utilities Office to be sent to the involved railroad that will then review the plans and advise the Department of any discrepancies in the railroad R/W.

20. Highway Design versus Local Tree Ordinances

Occasionally, conflicts between safe highway design and the location on state highway of tree or line of trees arise. Efforts will be made to retain a tree of significant value, whether significant by age or by its history. However, if all efforts to avoid a conflict with a tree cannot be accomplished using Department standard designs and practices, then the tree or line of trees may have to be sacrificed in order to complete the highway project for the safe movement of the traveling public.

Plan Preparation Guide

Chapter 13

Bridge Information

1. Plan Production Criteria for Bridge Replacement Projects

The number of bridge replacement projects has increased and the preparation time set for right of way and letting has been trimmed to a minimum. This will require Road Design to maximize its production efforts in order to meet this desired schedule. The following production schedule has been developed in order to make Road Design successful in meeting these obligation schedules. If you have a project with difficulties that will prevent you from meeting the schedule, please advise the Road Design Bridge Project Facilitator so that changes can be made to the schedule or project in order to make the program successful.

- Start original topography and cross sections within one month after receiving survey. Include wetland delineation from survey on plan sheet by shading and noting wetland area.
- Send two copies of the topography and cross sections within two months after receiving the survey to the Bridge Design Program Manager in order to obtain bridge lengths and elevations and to send to Preliminary Design for alignment relocation and design review and comments.
- Complete Design Field Review (DFR) Plans for field review six weeks after receiving bridge lengths and elevations, and Preliminary Design comments and/or revised design. Perform field review within two weeks of completing DFR Plans.
- Obtain Bridge Construction Access from District personnel on DFR. Show on plan sheet prior to completing right of way plans.
- After field review, complete plan sheets with corrected grades, construction lines, NPDES lines, and new R/W within two weeks. Provide revised plan sheets (not a full set of plans) to Bridge Design Program Manager for Environmental Study.
- If roadway hydrology needs to be designed and/or a NPDES study needs to be completed, send revised plans including cross-sections to the Hydraulic Engineering Section.
- Complete plans for Right of Way and Construction two months after the field review or one month after the hydraulic design and/or NPDES plan information is received.

A scoping review is held for all Bridge Replacement Projects. The roadway representative on these scoping meetings is Road Design's Bridge Project Facilitator. On return from the field review, the Facilitator forwards information to the Preliminary Design Engineer so that a Survey Request can be prepared. After the Preliminary Design Engineer prepares the Survey Request, it is sent back to the Bridge Project Facilitator in Road Design for review. The Facilitator sends the Survey Request to the responsible Program Development Office for review and submittal to Hydraulic Engineering and Traffic Engineering for their review. During this phase of project development, the Facilitator will prepare and provide a roadway cost estimate to the appropriate responsible Program Development Office. After all reviews are completed, the Survey Request is then submitted by the Program Development Office to the Surveys Office. Once the completed survey returns from the field, it is forwarded to Road Design where a Design Group is assigned for plan development.

On all bridge replacement projects, both primary and secondary, the designer will provide quantities for paving under guardrail. See Standard Drawing 403-2 for details. District personnel should determine on the Design Field Review how the paving under guardrail should be set-up. The pay item of "Paving Under Guardrail" by the square yard or additional quantities by the ton of the surface course and liquid binder will be provided on the "General Construction Note" sheet in the plans. The note next to the pay item on the "General Construction Note" sheet should say "For paving under guardrail per Standard Drawing 403-2".

2. Bridge Information

Bridges should be accurately drawn on plan sheets and flagged with a note that shows the Length, Type (Precast, Prestressed, R. C., etc.) and station_____ to station_____. (See example)

Generally, a minimum right of way width of 75 feet on each side of the structure centerline to a point 75 feet from each end of the bridge should be provided on all projects that have a single two-lane bridge. Where multilane or divided highway structures are proposed, the "proportional differences" between the existing or proposed roadway approach right of way, and the additional right of way required for the bridges should be established for the specific site conditions. Consideration should be given to construction staging, access for construction, and maintenance in establishing the need for permanent right of way and the need for temporary access for construction. For new location parallel bridges, the right of way should be 75 feet from each bridge centerline to the outside in relation to the position of each parallel bridge.

All applicable guardrail notes should be shown. (Covered under Chapter 10)

The profile should show the bridge thickness with an elevation shown at both ends of the bridge. Also show Toe of fill stations and slopes of fill under the bridge. If Riprap is to be placed along Toe of Fill, notes should be shown for Riprap as shown on the example. Hydrology data and High Water Mark must be shown. Earthwork should be omitted from Toe of Fill to Toe of Fill.

In some cases, it may be necessary to remove portions of old fill. This should be shown by cross hatching and showing as estimated unclassified excavation.

Superelevation should be computed so that no run off occurs on any portion of the bridge wherever possible.

On bridge replacement projects, the Bridge Design Section will be responsible for determining the need for the following bid items:

10508XX	CONSTRUCTION STAKES, LINES, AND GRADES
1090200	AS-BUILT CONSTRUCTION PLANS

Road Design will not be responsible for completing the information regarding these items found on the Design Plans Field Review sheet shown in Figure 5-B on page 5-7 of the Plan Preparation Guide. Road Design will not show these bid items on the approach plans or enter the items into the electronic system. Bridge Design will enter them into the system and show them on the bridge plans as applicable.

3. Bridge Construction Access

During the construction of bridges, the contractor's equipment has to be positioned near the new bridge site to facilitate construction activities. This location will be at one of the four corners of the new bridge and will be bounded by the body of water, railroad or highway being crossed, the right of way line and a distance to a traverse line 75 feet parallel to the construction centerline from the body of water, railroad, or highway.

In order to provide access to this location for large equipment (e.g., a crane), an access road, a short distance along the right of way line, may have to be made available to the contractor. The access road and equipment set-up site will be noted as the "Bridge Construction Access (BCA)" and will be shown on the plans. During the Design Field Review, the District representative will provide the location of the BCA. The designer will sketch the location on the plans during the field review. The right of way plans will show this access by a unique line that can be found in the custom line style palette and is shown here:

The area within the BCA line will be cleared and grubbed during construction. A silt fence will be installed along the outer most limits of the BCA. Permission should be obtained when the BCA is shown outside the right of way, but may have to be encompassed with permanent right of way due to the amount of work required within its boundaries. A minimum of 20 feet from the fill slope is required to the BCA line for a bridge construction access road. In the area of the new bridge within 75 feet of the water, highway or railroad, a minimum of 25 feet from the fill slope is needed to the BCA line. This width is needed for equipment set-up and material handling and can be increased depending on the type and/or amount of work. This width will be determined on the Design Field Review. The BCA line will only be shown at one corner of the future bridge site, unless conditions require additional access on other corners of the bridge.

4. Concrete Transition Curb and Flume At Bridge Ends

The designer will use "Concrete Transition Curb and Flume" with a paved shoulder area on all bridge ends. (The exception to this is the high side of superelevation sections wherein only the paved shoulder areas and concrete transition curbs will be constructed. The flume and riprap will be deleted on the high side of superelevated sections.) "Bridge Concrete Curb and Gutter with Flumes" will not be used.

Due to the complexity of construction and maintenance of the presently used concrete curb and gutter with flume for grades of 1% or greater, the concrete curb and gutter with asphalt flume as detailed by the Road Department will be used on all future projects unless directed otherwise. (See Road Standard Drawing No. 721-1.) Be aware of the two types of bridge ends, with and without a bridge approach slab. In addition, three linear feet of 9" x 15" concrete curb for each corner of the bridge using the concrete transition curb should be placed in the inclusions to be used as determined by the engineer.

Also please be aware of the following: Section C2.6.6.1 of the AASHTO LRFD Bridge Design Specifications states that "A longitudinal gradient on bridges should be maintained. Zero gradients and sag vertical curves should be avoided."

The Hydrology Section is to indicate when the asphalt flume will not be suitable and make recommendations for handling the water.

Liquid Asphalt binder PG64-22 is included in Hot Mix Surface Course for Ditching Paving. Hot Mix Surface Course of the same type used on the roadway shall be used for shoulder paving at an application rate of 500 Lbs./S.Y.

EXAMPLE FOR TWO BRIDGE ENDS (FOUR CORNERS) ON TANGENT NORMAL CROWN

Inclusion Note:

Concrete Transition Curb	(-- LF) for Bridge Ends
Hand Placed Rip Rap	(-- Tons) for Bridge Flume Ends

Geotextile for Erosion Control Under Rip Rap (Class 2) Type __	(-- S. Y.) to be placed under Hand Placed Rip Rap
*Hot Mix Surface Course	(-- Tons) for Drives --t (--), Leveling -- t (--) and Bridge Ends -- t (--)
*Asphalt Cement in Paving Mixture	(-- Tons) for Drives, Leveling & Bridge Ends
#Hot Mix Surf. Course For Ditch Paving	(-- Tons) For Flumes

*These quantities vary according to shoulder width
#This quantity varies according to fill height and slope

Note For Plan Sheet (to Be Placed On One Corner Only)

Construct Shoulder Paving, Bridge End
Concrete Transition Curb And Flume With Riprap
^Erect Thrie Beam Bridge Connector and End Treatment Type T
(Typical Four Corners)

^Bridge end protection note may be modified to fit varying end treatment conditions

EXAMPLE FOR TWO BRIDGE ENDS (FOUR CORNERS) ON CURVE – SUPERELEVATED

Inclusion Note:

Concrete Transition Curb	(-- LF) for Bridge Ends
Hand Placed Rip Rap	(-- Tons) for Bridge Flume Ends
Geotextile for Erosion Control Under Rip Rap (Class 2) Type __	(-- S. Y.) to be placed under Hand Placed Rip Rap
*Hot Mix Surface Course	(-- Tons) for Drives --t (--), Leveling --t (--) and Bridge Ends --t (--)
*Asphalt Cement in Paving Mixture	(-- Tons) for Drives, Leveling & Bridge Ends
#Hot Mix Surf. Course For Ditch Paving	(-- Tons) For Flumes

*These quantities vary according to shoulder width
#This quantity varies according to fill height and slope

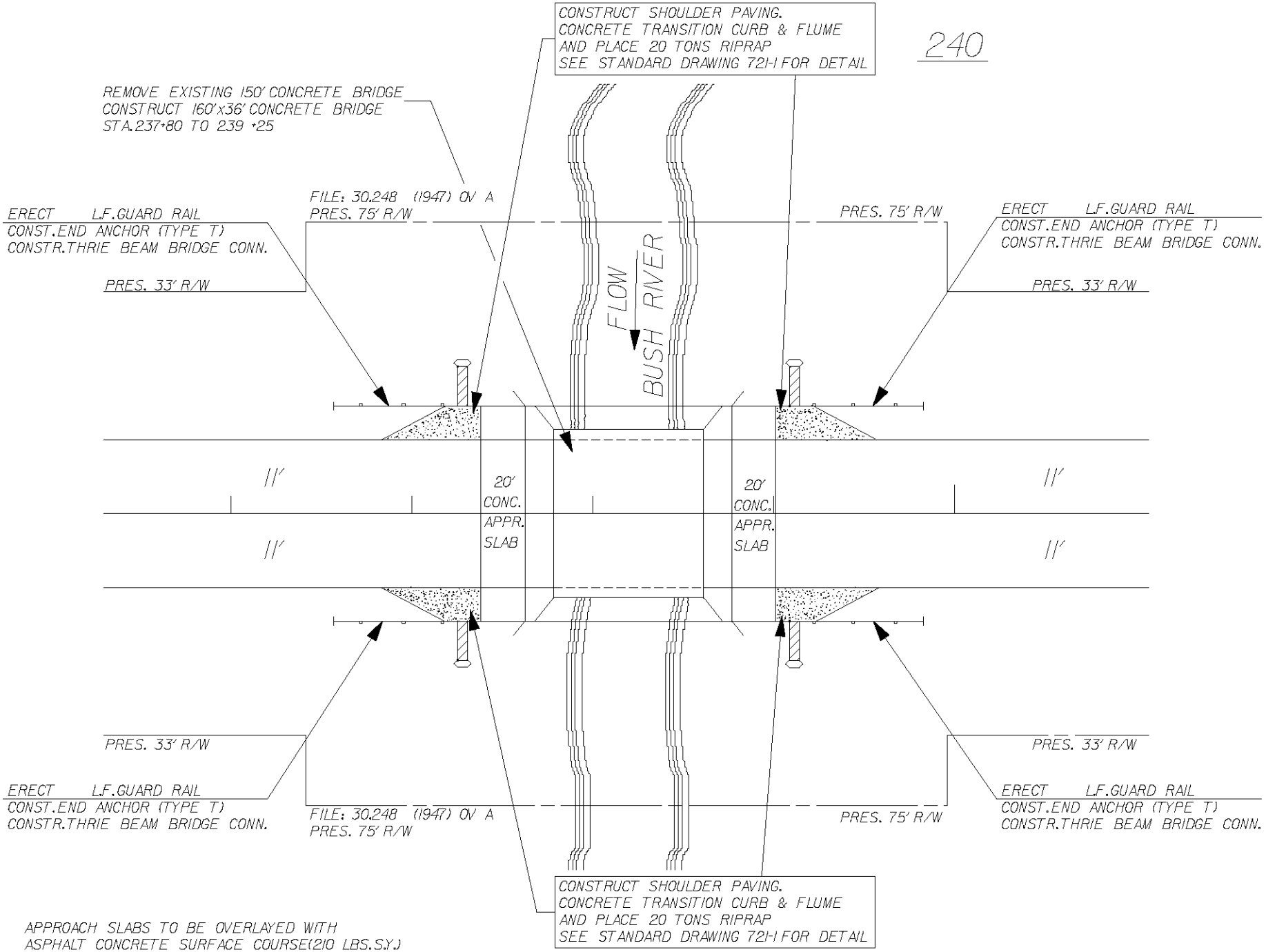
Note For Plan Sheet (to Be Placed On One Corner Only)

Construct Shoulder Paving, Bridge End
Concrete Transition Curb And Flume With Riprap
^Erect Thrie Beam Bridge Connector and End Treatment Type T
(Typical Four Corners)

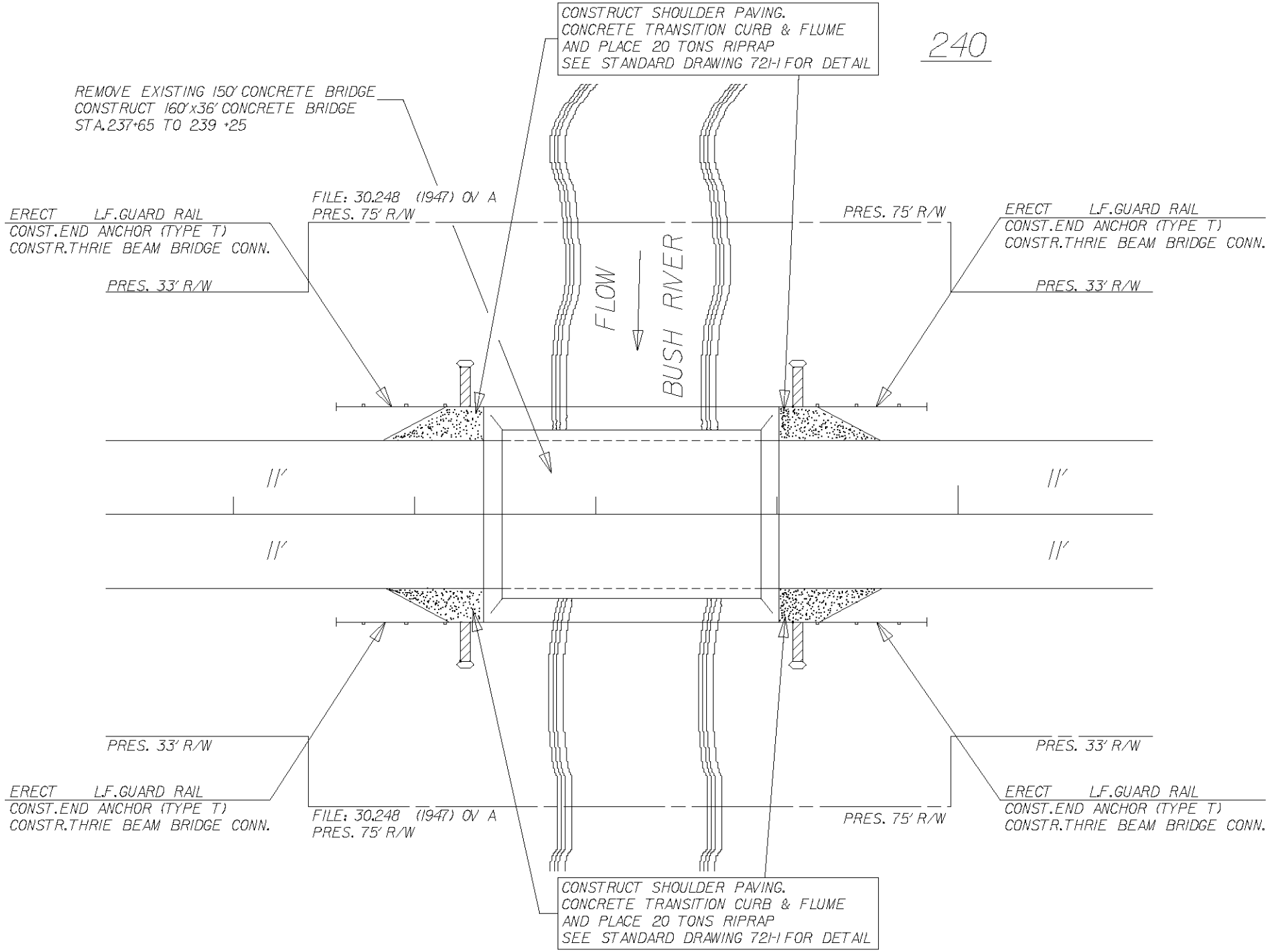
^Bridge end protection note may be modified to fit varying end treatment conditions.

Do not place “Concrete Transition Curb and Flume” on the high side of a superelevated bridge. Paved shoulder will be included on high side of superelevation.

See the following sheets for an example of a bridge location.



EXAMPLE OF BRIDGE WITH APPROACH SLABS



EXAMPLE OF BRIDGE WITHOUT APPROACH SLABS

Plan Preparation Guide

Chapter 14

Railroad Information

1. Railroad Information

Railroads shall be plotted in detail showing mileposts, right-of-way, and existing and new drainage. Rail elevations are to be shown on the profile sheet. The minimum distance a drainage pipe will be placed is 20 L.F. from the centerline of the railroad in a parallel ditch. Also, the minimum size pipe structured shall be no less than 24" in diameter. New pipe being placed under the railroad will be 24" Minimum Diameter, 36" for Norfolk Southern, Pipe Culvert Class V. (See sheet 14-3 for example)

2. Railroad Grade Separations

At railroad grade separations, a profile is necessary on the survey centerline beneath the bridge. A traverse on the centerline of the railroad 200' left and 200' right (minimum) of survey centerline with appropriate topography is also required.

Additional information needed by the railroads is cross-sections perpendicular to the track. If these cross-sections are omitted from the survey, contact the appropriate Engineer as soon as possible.

The above-mentioned sections should be plotted on cross-section paper to the largest horizontal scale that will accommodate the entire railroad right-of-way. The topography of the traverse should be plotted on the mainline plan sheet. No profile of the railroad traverse will be necessary. The cross-sections should be plotted normally (displayed graphic horizontal and vertical scale) with the sheet being clearly labeled under the box. This sheet is for railroad use only, not to be included in our plans, and should be given the Bridge Design for submittals and appropriate railroad for their preliminary review along with bridge plans.

Cross-sections are required every 25' within the railroad right-of-way within 100' each side of survey centerline. Beyond 100' of centerline, elevations on the top of rails are necessary (See sheet 14-4 for an example)

Also, the railroad requests we indicate our roadway fill slope on the three interior cross-sections.

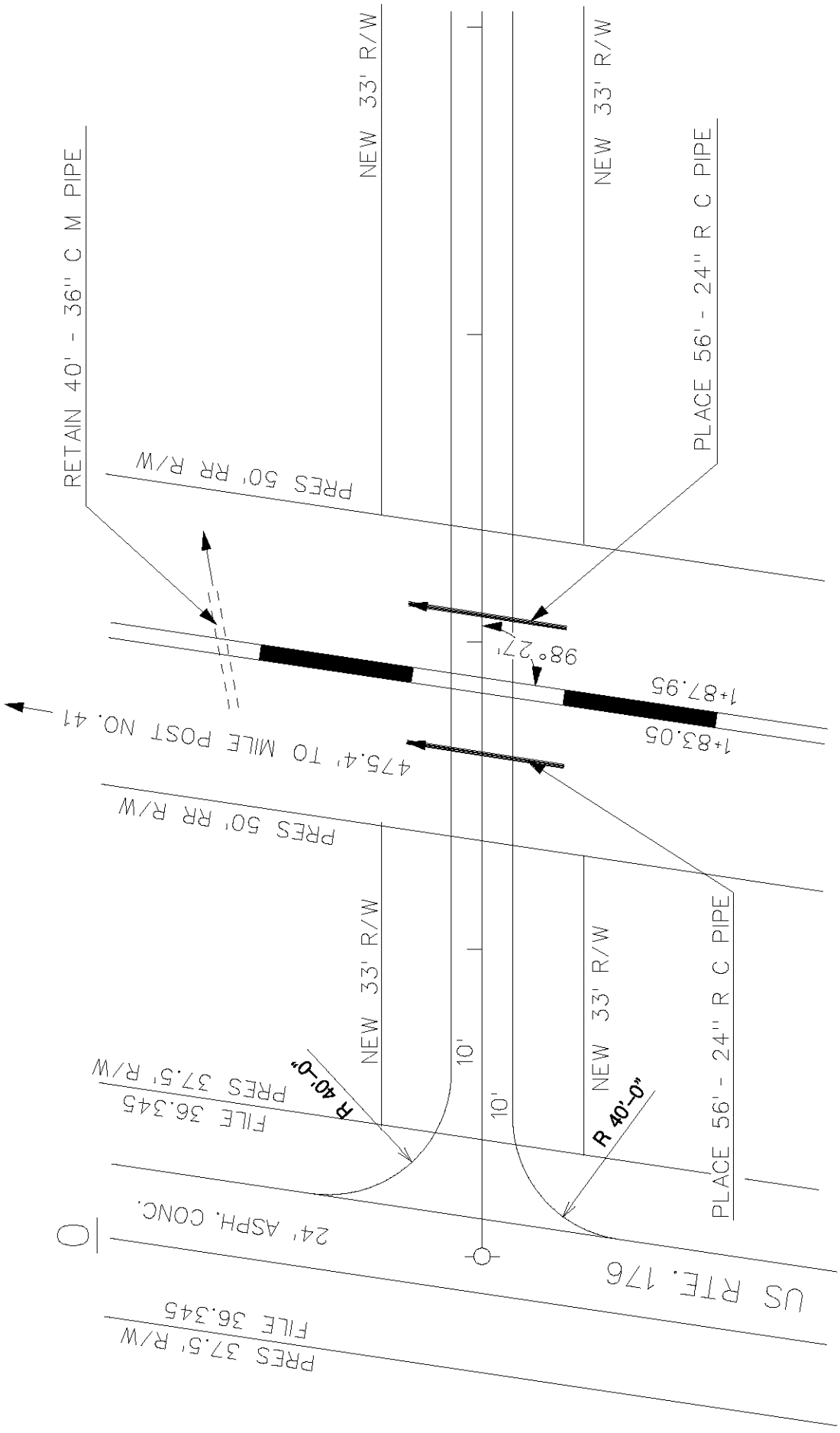
3. Prints to Utilities

When Field Review prints are returned to a Road Design Group by the Project Manager, the Road Design Group will check the Field Review Title Sheet for the designation of railroad involvement. A note has been added to this sheet to note "Railroad Involvement". If there is "Railroad Involvement", it shall be noted on the Title Sheet.

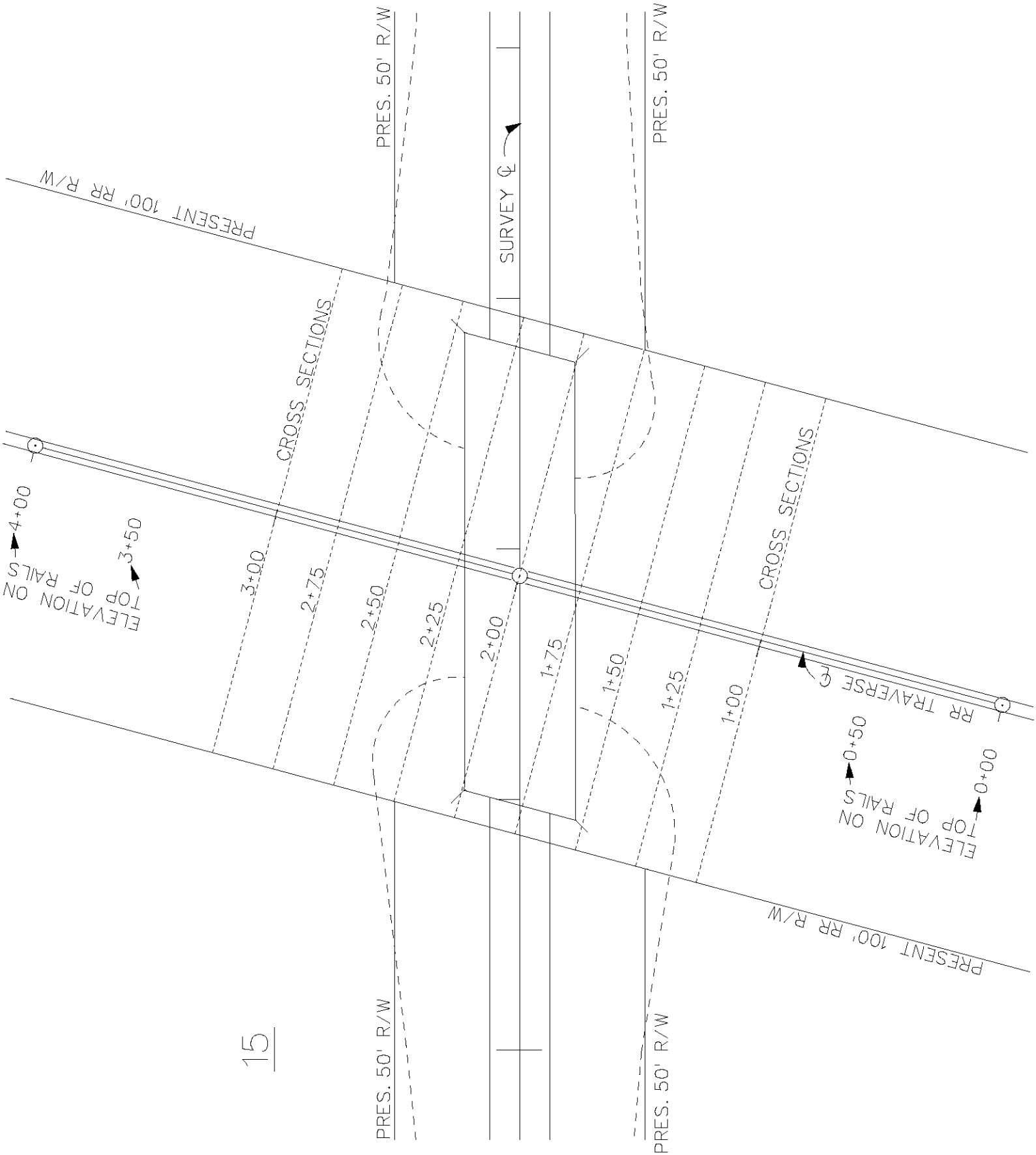
If the Title Sheet does not reveal railroad involvement, the Road Design Group should thoroughly review the plans for any encroachment on railroad right-of-way.

When there is railroad involvement, plans will be sent to the Utilities Office in accordance with Engineering Directive Memorandum PC-22. Road Design Groups will provide revised plans to the Operations Center for distribution to the Utilities Office for any subsequent changes to plans affecting the railroad right-of-way.

EXAMPLE OF RAILROAD INFORMATION



EXAMPLE OF RAILROAD INFORMATION



Plan Preparation Guide

Chapter 15

Plan Index

1. Plan Organization

Listed below are the sheet numbers that are permanently assigned to certain drawings and a listing of additional drawings to be incorporated into each number set.

The following procedure for drawing organization and sheet numbering may require some alteration or additions. Such alteration should be discussed with and approved by the Project/Engineering Facilitator during plan development.

SHEET NUMBERING SYSTEM

Sheet No.	Description
1, 1A, etc.	Title Sheet
2, 2A, 2B, etc.	Summary of Estimated Quantities; Demolition and Moving Items; Reset/new Fences, etc.
3, 3A, 3B, etc.	Typical Sections and Miscellaneous Details (Not Covered by Roadway Standard Drawings)
4, 4A, 4B, etc.	R/W Data Sheet; Property Strip Map; and Property Closure Sheets
5, 5A, 5B, etc.	General Construction Note, Reference Sheet, Index Sheet
6, 7, 8, etc.	Plan and Profile Sheets (Mainline, Side Roads, Ramp, etc.)
12, 13, 14, etc.	Blow-ups of Plan Sheets; Geometric and Grading Plan for Intersections and Interchanges; Top of Curb Elevations (If can not be shown on plan and profile sheets)
TC1, TC2, etc.	Traffic Control and Construction Phasing; Detour Plan and Profile Sheets
E1, E2, etc.	Electrical and Lighting Plans
L1, L2, etc.	Landscaping Plans
PM1, PM2, etc.	Pavement Marking Plans
SN1, SN2, etc.	Signing Plans
TS1, TS2, etc.	Traffic Signal Plans
S1, S2, etc.	Roadway Structure Plans, (Retaining Walls, Box Culvert, Misc.)
EC1, EC2, etc.	Erosions Control Plans
X1, X2, etc.	Cross-Sections
BR1, BR2, etc.	Bridge Plans

If road profiles are shown on a separate sheet, that sheet should follows the plan sheet and be numbered as an “A” sheet. Example: Sheet 6A, wherein sheet 6 represents the plan sheet.

Only the title sheet will contain the total plan sheet count, and this number will be shown in the box in the upper right-hand corner of the title sheet. As the plan development process proceeds through preliminary right-of-way and construction plans, the number of plan sheets will obviously change, and the number in the box will be revised accordingly.

Upon completion of construction plans, the number shown in the top right box will reflect the sum of the total sheet count as contained in the index of sheets.

2. Index Of Plan Sheets

The index is generally placed in the upper left corner of the title sheet. The numbering system should include all sheets identified with a letter suffix. Sheet descriptions shall be brief and informative. Methodology of sheet numbering is addressed in Plan Organization.

If bridge plans are prepared independently by Bridge Design such plans will be structured in accordance with their preestablished format.

The total sheets in a series of numbers shall be shown in a third column to the right of the sheet descriptions on the last line of the series.

If a series of sheets preceding the plan and profile sheets are omitted, the sheet number and the word “Omitted” shall be shown.

Examples of indexes are on the following sheet.

EXAMPLE OF A SECONDARY PROJECT INDEX

INDEX OF SHEETS

SHEET NO.	DESCRIPTION	SHEET SUBTOTALS
1	Title Sheet	1
2	Quantity Sheet	1
3	Typical Sections & Misc. Details	1
4	Right-of-Way Data Sheet	1
5	Construction Notes	1
5A	Reference Sheet	1
6	Plan and Profile	1
X1 - X3	Cross Sections	3
		10

EXAMPLE OF A PRIMARY PROJECT INDEX

INDEX OF SHEETS

SHEETS NO.	DESCRIPTION	SHEET SUBTOTALS
1	Title Sheet	1
2	Quantity Sheet	
2A	Moving Item Sheet	2
3 - 3B	Typical Sections	3
3C	Catch Basin Type 16 Standard	1
4 - 4C	Property Data and Closures	4
5	Construction Notes	1
5A	Reference Sheet	1
6 - 11	Plan and Profile (Main Line)	
12 - 13	Detail of Profile (Intersecting Rds.)	
14	Detail of Intersection at Rd. S-16	9
TC1 - TC2	Detail of Detours	2
L1	Landscaping Plan at Rd. S-16	1
PM1 - PM4	Pavement Marking Plans	4
SN1 - SN2	Signing Plans	2
EC1	Erosion Control Plan	1
X1 - X15	Cross Sections (Main Line)	15
X16 - X18	Cross Sections (Intersecting Rds.)	3
		50

Plan Preparation Guide

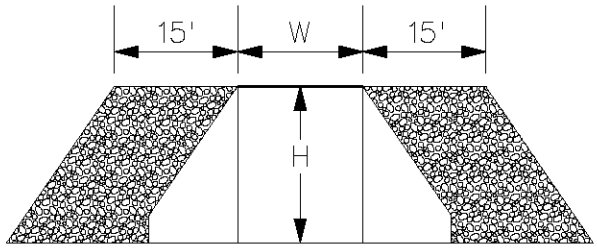
Chapter 16

Miscellaneous Tables, Charts, and Formulas

1. RIPRAP FOR BOX CULVERTS

ESTIMATED RIPRAP QUANTITIES			
HEIGHT OF BOX	2:1 SLOPE TONS	4:1 SLOPE TONS	6:1 SLOPE TONS
4'	14	26	38
5'	18	32	47
6'	21	39	57
7'	25	45	66
8'	28	51	76
9'	31	58	85
10'	35	64	95
11'	38	71	104
12'	42	77	114
13'	45	84	123
14'	49	90	133
15'	52	96	142

QUANTITIES ARE FOR ONE END OF CULVERT
QUANTITIES DO NOT INCLUDE CHANNEL RIPRAP

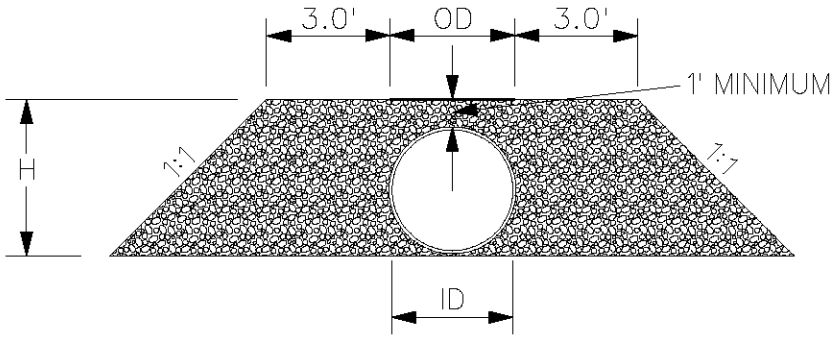


H = VERTICAL HEIGHT OF BOX CULVERT
W = OUTSIDE WIDTH OF BOX CULVERT
RIPRAP WEIGHT = 3400 LBS. PER C.Y.
RIPRAP DEPTH = 1.0'

2. RIPRAP FOR PIPE

ESTIMATED RIPRAP QUANTITIES				
PIPE SIZE		2:1 SLOPE TONS	4:1 SLOPE TONS	6:1 SLOPE TONS
ID	OD			
18"	23"	2	3	4
24"	30"	3	4	5
30"	37"	3	5	7
36"	44"	4	6	9
42"	51"	5	8	11
48"	58"	6	9	13
54"	65"	7	12	16
60"	72"	8	14	19
72"	86"	12	19	27
84"	100"	15	25	36
96"	114"	19	33	46
108"	128"	24	40	58
120"	140"	28	48	68

QUANTITIES ARE FOR ONE END OF PIPE
QUANTITIES DO NOT INCLUDE CHANNEL RIPRAP



ID = INSIDE PIPE DIAMETER
OD = OUTSIDE DIAMETER
H = VERTICAL HEIGHT
VERTICAL HEIGHT = 1.2 OD OR 1.0' MINIMUM ABOVE TOP OF PIPE
WEIGHT OF RIPRAP = 3400 LBS PER C.Y.
DEPTH OF RIPRAP = 1.0'

INCHES and FRACTIONS in DECIMALS of A FOOT

Inches	Decimals of a Foot	Fraction Equivalents of Decimals	Inches	Decimals of a Foot	Fraction Equivalents of Decimals	Inches	Decimals of a Foot	Fraction Equivalents of Decimals
1/32	0.0026		4	0.3333		8	0.6667	
1/16	.0052		4 1/16	.3385		8 1/16	.671875	43/64
3/32	.0104		4 1/8	.34375	11/32	8 1/8	.6771	
1/16	.015625	1/64	4 3/16	.3490		8 3/16	.6823	
1/8	0.0208		4 1/4	0.3542		8 1/4	0.6875	11/16
5/64	.0260		4 5/16	.359375	23/64	8 5/16	.6927	
3/32	.03125	1/32	4 3/8	.3646		8 3/8	.6979	
7/64	.0365		4 7/16	.3698		8 7/16	.703125	45/64
1/16	0.0417		4 1/2	0.3750	3/8	8 1/2	0.7083	
9/64	.046875	3/64	4 9/16	.3802		8 9/16	.7135	
5/32	.0521		4 5/8	.3854		8 5/8	.71875	23/32
11/64	.0573		4 11/16	.390625	25/64	8 11/16	.7240	
3/32	0.0625	1/16	4 3/4	0.3958		8 3/4	0.7292	
13/64	.0677		4 13/16	.4010		8 13/16	.734375	47/64
7/32	.0729		4 7/8	.40625	13/32	8 7/8	.7396	
15/64	.078125	5/64	4 15/16	.4115		8 15/16	.7448	
1/8	0.0833		5	0.4167		9	0.7500	3/4
1 1/16	.0885		5 1/16	.421875	27/64	9 1/16	.7552	
1 1/8	.09375	3/32	5 1/8	.4271		9 1/8	.7604	
1 3/16	.0990		5 3/16	.4323		9 3/16	.765625	49/64
1 1/4	0.1042		5 1/4	0.4375	7/16	9 1/4	0.7708	
1 5/16	.109375	7/64	5 5/16	.4427		9 5/16	.7760	
1 3/8	.1146		5 3/8	.4479		9 3/8	.78125	25/32
1 7/16	.1198		5 7/16	.453125	29/64	9 7/16	.7865	
1 1/2	0.1250	1/8	5 1/2	0.4583		9 1/2	0.7917	
1 9/16	.1302		5 9/16	.4635		9 9/16	.796875	51/64
1 5/8	.1354		5 5/8	.46875	15/32	9 5/8	.8021	
1 11/16	.140625	9/64	5 11/16	.4740		9 11/16	.8073	
1 3/4	0.1458		5 3/4	0.4792		9 3/4	0.8125	13/16
1 13/16	.1510		5 13/16	.484375	31/64	9 13/16	.8177	
1 7/8	.15625	5/32	5 7/8	.4896		9 7/8	.8229	
1 15/16	.1615		5 15/16	.4948		9 15/16	.828125	53/64
2	0.1667		6	0.5000	1/2	10	0.8333	
2 1/16	.171875	11/64	6 1/16	.5052		10 1/16	.8385	
2 1/8	.1771		6 1/8	.5104		10 1/8	.84375	27/32
2 3/16	.1823		6 3/16	.515625	33/64	10 3/16	.8490	
2 1/4	0.1875	3/16	6 1/4	0.5208		10 1/4	0.8542	
2 5/16	.1927		6 5/16	.5260		10 5/16	.859375	55/64
2 3/8	.1979		6 3/8	.53125	17/32	10 3/8	.8646	
2 7/16	.203125	13/64	6 7/16	.5365		10 7/16	.8698	
2 1/2	0.2083		6 1/2	0.5417		10 1/2	0.8750	7/8
2 9/16	.2135		6 9/16	.546875	35/64	10 9/16	.8802	
2 5/8	.21875	7/32	6 5/8	.5521		10 5/8	.8854	
2 11/16	.2240		6 11/16	.5573		10 11/16	.890625	57/64
2 3/4	0.2292		6 3/4	0.5625	9/16	10 3/4	0.8958	
2 13/16	.234375	15/64	6 13/16	.5677		10 13/16	.9010	
2 7/8	.2396		6 7/8	.5729		10 7/8	.90625	29/32
2 15/16	.2448		6 15/16	.578125	37/64	10 15/16	.9115	
3	0.2500	1/4	7	0.5833		11	0.9167	
3 1/16	.2552		7 1/16	.5885		11 1/16	.921875	59/64
3 1/8	.2604		7 1/8	.59375	19/32	11 1/8	.9271	
3 3/16	.265625	17/64	7 3/16	.5990		11 3/16	.9323	
3 1/4	0.2708		7 1/4	0.6042		11 1/4	0.9375	15/16
3 5/16	.2760		7 5/16	.609375	39/64	11 5/16	.9427	
3 3/8	.28125	9/32	7 3/8	.6146		11 3/8	.9479	
3 7/16	.2865		7 7/16	.6198		11 7/16	.953125	61/64
3 1/2	0.2917		7 1/2	0.6250	5/8	11 1/2	0.9583	
3 9/16	.296875	19/64	7 9/16	.6302		11 9/16	.9635	
3 5/8	.3021		7 5/8	.6354		11 5/8	.96875	31/32
3 11/16	.3073		7 11/16	.640625	41/64	11 11/16	.9740	
3 3/4	0.3125	5/16	7 3/4	0.6458		11 3/4	0.9792	
3 13/16	.3177		7 13/16	.6510		11 13/16	.984375	63/64
3 7/8	.3229		7 7/8	.65625	21/32	11 7/8	.9896	
3 15/16	.328125	21/64	7 15/16	.6615		11 15/16	.9948	

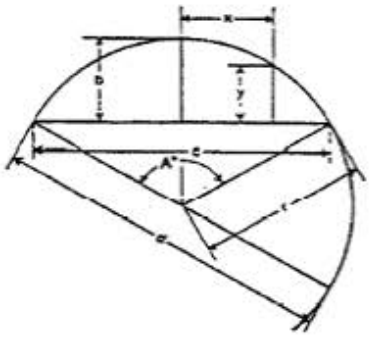
DECIMAL EQUIVALENTS OF FRACTIONAL PARTS OF ONE INCH

1/64	.015625	17/64	.265625	33/64	.515625	49/64	.765625
1/32	.031250	9/32	.281250	17/32	.531250	25/32	.781250
3/64	.046875	19/64	.296875	35/64	.546875	51/64	.796875
1/16	.062500	5/16	.312500	9/16	.562500	13/16	.812500
5/64	.078125	21/64	.328125	37/64	.578125	53/64	.828125
3/32	.093750	11/32	.343750	19/32	.593750	27/32	.843750
7/64	.109375	23/64	.359375	39/64	.609375	55/64	.859375
1/8	.125000	3/8	.375000	5/8	.625000	7/8	.875000
9/64	.140625	25/64	.390625	41/64	.640625	57/64	.890625
5/32	.156250	13/32	.406250	21/32	.656250	29/32	.906250
11/64	.171875	27/64	.421875	43/64	.671875	59/64	.921875
3/16	.187500	7/16	.437500	11/16	.687500	15/16	.937500
13/64	.203125	29/64	.453125	45/64	.703125	61/64	.953125
7/32	.218750	15/32	.468750	23/32	.718750	31/32	.968750
15/64	.234375	31/64	.484375	47/64	.734375	63/64	.984375
1/4	.250000	1/2	.500000	3/4	.750000	1	1.000000

ASTM STANDARD REINFORCING BARS

BAR SIZE DESIGNATION	AREA* SQ. INCHES	WEIGHT POUNDS PER FT.	DIAMETER* INCHES
#3	.11	.376	.375
#4	.20	.668	.500
#5	.31	1.043	.625
#6	.44	1.502	.750
#7	.60	2.044	.875
#8	.79	2.670	1.000
#9	1.00	3.400	1.128
#10	1.27	4.303	1.270
#11	1.56	5.313	1.410
#14	2.25	7.650	1.693
#18	4.00	13.600	2.257

PROPERTIES OF THE CIRCLE



Circumference = 6.28318 r = 3.14159 d
Diameter = 0.31831 circumference
Area = 3.14159 r^2

Arc $a = \frac{\pi r A^\circ}{180^\circ} = 0.017453\, r A^\circ$

Angle $A^\circ = \frac{180^\circ a}{\pi r} = 57.29578 \frac{a}{r}$

Radius $r = \frac{4b^2 + c^2}{8b}$

Chord $c = 2\sqrt{2br - b^2} = 2r \sin \frac{A}{2}$

Rise $b = r - \frac{1}{2}\sqrt{4r^2 - c^2} = \frac{c}{2} \tan \frac{A}{4}$

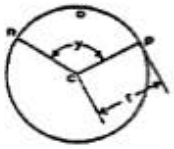
$= 2r \sin^2 \frac{A}{4} = r + y - \sqrt{r^2 - x^2}$

$y = b - r + \sqrt{r^2 - x^2}$

$x = \sqrt{r^2 - (r + y - b)^2}$

Diameter of circle of equal periphery as square = 1.27324 side of square
Side of square of equal periphery as circle = 0.78540 diameter of circle
Diameter of circle circumscribed about square = 1.41421 side of square
Side of square inscribed in circle = 0.70711 diameter of circle

CIRCULAR SECTOR



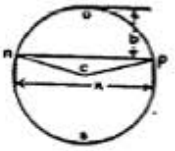
r = radius of circle y = angle ncp in degrees

Area of Sector ncpo = ½ (length of arc nop × r)

= Area of Circle × $\frac{y}{360}$

= 0.0087266 × r^2 × y

CIRCULAR SEGMENT



r = radius of circle x = chord b = rise

Area of Segment nop = Area of Sector ncpo — Area of triangle ncp

$= \frac{(\text{Length of arc nop} \times r) - x(r - b)}{2}$

Area of Segment nsp = Area of Circle — Area of Segment nop

VALUES FOR FUNCTIONS OF π

π = 3.14159265359, log = 0.4971499

π^2 = 9.8696044, log = 0.9942997 $\frac{1}{\pi}$ = 0.3183099, log = $\bar{1}$.5028501 $\sqrt{\frac{1}{\pi}}$ = 0.5641896, log = $\bar{1}$.7514251

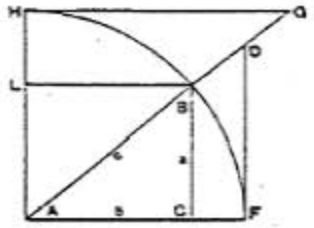
π^3 = 31.0062767, log = 1.4914496 $\frac{1}{\pi^2}$ = 0.1013212, log = $\bar{1}$.0057003 $\frac{\pi}{180}$ = 0.0174533, log = $\bar{2}$.2418774

$\sqrt{\pi}$ = 1.7724539, log = 0.2485749 $\frac{1}{\pi^3}$ = 0.0322515, log = $\bar{2}$.5085500 $\frac{180}{\pi}$ = 57.2957795, log = 1.7581226

Note: Logs of fractions such as $\bar{1}$.5028501 and $\bar{2}$.5085500 may also be written 9.5028501 − 10 and 8.5085500 − 10 respectively.

TRIGONOMETRIC FORMULAS

TRIGONOMETRIC FUNCTIONS



Radius AF $= 1$

$= \sin^2 A + \cos^2 A = \sin A \operatorname{cosec} A$

$= \cos A \sec A = \tan A \cot A$

Sine A $= \dfrac{\cos A}{\cot A} = \dfrac{1}{\operatorname{cosec} A} = \cos A \tan A = \sqrt{1 - \cos^2 A} = BC$

Cosine A $= \dfrac{\sin A}{\tan A} = \dfrac{1}{\sec A} = \sin A \cot A = \sqrt{1 - \sin^2 A} = AC$

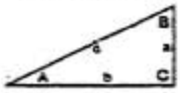
Tangent A $= \dfrac{\sin A}{\cos A} = \dfrac{1}{\cot A} = \sin A \sec A = FD$

Cotangent A $= \dfrac{\cos A}{\sin A} = \dfrac{1}{\tan A} = \cos A \operatorname{cosec} A = HG$

Secant A $= \dfrac{\tan A}{\sin A} = \dfrac{1}{\cos A} = AD$

Cosecant A $= \dfrac{\cot A}{\cos A} = \dfrac{1}{\sin A} = AG$

RIGHT ANGLED TRIANGLES



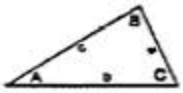
$a^2 = c^2 - b^2$

$b^2 = c^2 - a^2$

$c^2 = a^2 + b^2$

Known	Required					
	A	B	a	b	c	Area
a, b	$\tan A = \frac{a}{b}$	$\tan B = \frac{b}{a}$			$\sqrt{a^2 + b^2}$	$\frac{ab}{2}$
a, c	$\sin A = \frac{a}{c}$	$\cos B = \frac{a}{c}$		$\sqrt{c^2 - a^2}$		$\frac{a\sqrt{c^2 - a^2}}{2}$
A, a		$90° - A$		$a \cot A$	$\frac{a}{\sin A}$	$\frac{a^2 \cot A}{2}$
A, b		$90° - A$	$b \tan A$		$\frac{b}{\cos A}$	$\frac{b^2 \tan A}{2}$
A, c		$90° - A$	$c \sin A$	$c \cos A$		$\frac{c^2 \sin 2A}{4}$

OBLIQUE ANGLED TRIANGLES



$s = \dfrac{a + b + c}{2}$

$K = \sqrt{\dfrac{(s-a)(s-b)(s-c)}{s}}$

$a^2 = b^2 + c^2 - 2bc \cos A$

$b^2 = a^2 + c^2 - 2ac \cos B$

$c^2 = a^2 + b^2 - 2ab \cos C$

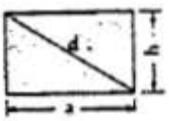
Known	Required					
	A	B	C	b	c	Area
a, b, c	$\tan \frac{1}{2}A = \frac{K}{s-a}$	$\tan \frac{1}{2}B = \frac{K}{s-b}$	$\tan \frac{1}{2}C = \frac{K}{s-c}$			$\sqrt{s(s-a)(s-b)(s-c)}$
a, A, B			$180° - (A+B)$	$\frac{a \sin B}{\sin A}$	$\frac{a \sin C}{\sin A}$	
a, b, A		$\sin B = \frac{b \sin A}{a}$			$\frac{b \sin C}{\sin B}$	
a, b, C	$\tan A = \frac{a \sin C}{b - a \cos C}$				$\sqrt{a^2 + b^2 - 2ab \cos C}$	$\frac{ab \sin C}{2}$

AREAS OF PLANE FIGURES

Square

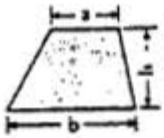
Diagonal $= d = s\sqrt{2}$.
Area $= s^2 = 4b^2 = 0.5d^2$.
Example. $s = 6$; $b = 3$. Area $= (6)^2 = 36$ Ans.
$d = 6 \times 1.414 = 8.484$ Ans.

Rectangle and Parallelogram



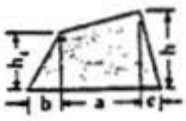
Area $= ab$ or $b\sqrt{d^2 - b^2}$
Example. $a = 6$; $b = 3$.
Area $= 3 \times 6 = 18$ Ans

Trapezoid



Area $= \frac{1}{2}h(a + b)$
Example. $a = 2$; $b = 4$; $h = 3$.
Area $= \frac{1}{2} \times 3(2 + 4) = 9$. Ans.

Trapezium



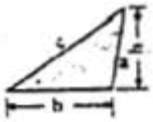
Area $= \frac{1}{2}[a(h + h^1) + bh^1 + ch]$
Example. $a = 4$; $b = 2$; $c = 2$; $h = 3$; $h^1 = 2$.
Area $= \frac{1}{2}[4(3 + 2) + (2 \times 2) + (2 \times 3)] = 15$. Ans.

Triangles

Both formulas apply to both figures

Area $= \frac{1}{2}bh$.
Example. $h = 3$; $b = 5$.
Area $= \frac{1}{2}(3 \times 5) = 7\frac{1}{2}$. Ans.

Area $= \sqrt{S(S - a)(S - b)(S - c)}$ when $S = \frac{a + b + c}{2}$



Example. $a = 2$; $b = 3$; $c = 4$.

$$S = \frac{2 + 3 + 4}{2} = 4.5$$

Area $= \sqrt{4.5(4.5 - 2)(4.5 - 3)(4.5 - 4)} = 2.9$. Ans.

Regular Polygons

Area
- 5 sides $= 1.720477\ S^2 = 3.63271\ r^2$
- 6 " $= 2.598150\ S^2 = 3.46410\ r^2$
- 7 " $= 3.633875\ S^2 = 3.37101\ r^2$
- 8 " $= 4.828427\ S^2 = 3.31368\ r^2$
- 9 " $= 6.181875\ S^2 = 3.27573\ r^2$
- 10 " $= 7.694250\ S^2 = 3.24920\ r^2$
- 11 " $= 9.365675\ S^2 = 3.22993\ r^2$
- 12 " $= 11.196300\ S^3 = 3.21539\ r^2$

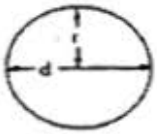
n = number of sides; r = short radius;
S = length of side; R = long radius.

$$\text{Area} = \frac{n}{4} S^2 \cot. \frac{180^\circ}{n} = \frac{n}{2} R^2 \sin. \frac{360^\circ}{n}$$
$$= nr^2 \tan \frac{180^\circ}{n}$$

AREAS OF PLANE FIGURES

Circle

$\pi = 3.1416$; A = area; d = diameter; p = circumference or periphery; r = radius.



$p = \pi d = 3.1416d, \quad p = 2\sqrt{\pi A} = 3.54\sqrt{A}$

$p = 2\pi r = 6.2832r, \quad p = \frac{2A}{r} = \frac{4A}{d}$

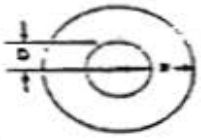
$d = \frac{p}{\pi} = \frac{p}{3.1416}, \quad d = 2\sqrt{\frac{A}{\pi}} = 1.128\sqrt{A}$

$r = \frac{p}{2\pi} = \frac{p}{6.2832}, \quad r = \sqrt{\frac{A}{\pi}} = 0.564\sqrt{A}$

$A = \frac{\pi d^2}{4} = 0.7854d^2, \quad A = \frac{p^2}{4\pi} = \frac{p^2}{12.57}$

$A = \pi r^2 = 3.1416r^2, \quad A = \frac{pr}{2} = \frac{pd}{4}$

Circular Ring



Area $= \pi(R^2 - r^2) = 3.1416(R^2 - r^2)$

Area $= 0.7854(D^2 - d^2) = 0.7854(D - d)(D + d)$

Area = difference in areas between the inner and outer circles.

Example. $R = 4$; $r = 2$.

Area $= 3.1416(4^2 - 2^2) = 37.6992$. Ans.

Quadrant

$\text{Area} = \frac{\pi r^2}{4} = 0.7854r^2 = 0.3927c^2.$

Example. $r = 3$. c = chord.

Area $= .7854 \times 3^2 = 7.0686$. Ans.

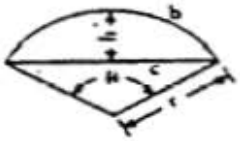
Segment

b = length of arc. θ = angle in degrees

c = chord $= \sqrt{4(2hr - h^2)}$

$\text{Area} = \frac{1}{2}\{br - c(r - h)\}$

$= \pi r^2 \frac{\theta}{360} - \frac{c(r - h)}{2}$



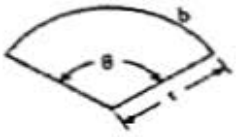
When θ is greater than 180° then $\frac{c}{2} \times$ difference between r and h is added to the fraction $\frac{\pi r^2 \theta}{360}$

Example. $r = 3$. $\theta = 120°$; $h = 1.5$

$\text{Area} = 3.1416 \times 3^2 \times \frac{120}{360} - \frac{5.196(3 - 1.5)}{2}$

$= 5.5278$. Ans.

Sector



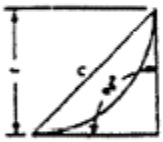
$\text{Area} = \frac{br}{2} = \pi r^2 \frac{\theta}{360°}$

θ = angle in degrees; b = length of arc.

Example. $r = 3$; $\theta = 120°$

$\text{Area} = 3.1416 \times 3^2 \times \frac{120}{360} = 9.4248$. Ans.

AREAS OF PLANE FIGURES



Spandrel

Area $= 0.2146r^2 = 0.1073c^2$

Example. $r = 3$

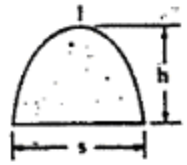
Area $= 0.2146 \times 3^2 = 1.9314$. Ans

Parabola

l = length of curved line = periphery $- s$

$$l = \frac{s^2}{8h}\left[\sqrt{c(1+c)} + 2.0320 \times \log\left(\sqrt{c}+\sqrt{1+c}\right)\right]$$

in which $c = \left(\frac{4h}{s}\right)^2$



$$\text{Area} = \frac{2}{3}sh$$

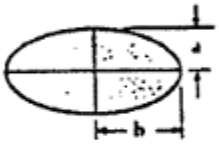
Example. $s = 3$; $h = 4$

$$\text{Area} = \frac{2}{3} \times 3 \times 4 = 8. \text{ Ans.}$$

Ellipse

$$\text{Area} = \pi ab = 3.1416ab$$

$$\text{Circum.} = 2\pi\sqrt{\frac{a^2 + b^2}{2}} \text{ (close approximation)}$$



Example. $a = 3$; $b = 4$.

Area $= 3.1416 \times 3 \times 4 = 37.6992$. Ans.

$$\text{Circum.} = 2 \times 3.1416\sqrt{\frac{(3)^2 + (4)^2}{2}}$$

$$= 6.2832 \times 3.5355 = 22.21 \text{ Ans.}$$

Vertical Height	SLOPE DISTANCE							
	½:1	1:1	1½:1	2:1	2½:1	3:1	4:1	6:1
1	1	1	2	2	3	3	4	6
2	2	3	4	4	5	6	8	12
3	3	4	5	7	8	9	12	18
4	4	6	7	9	11	13	16	24
5	6	7	9	11	14	16	21	30
6	7	8	11	13	16	19	25	36
7	8	10	13	15	19	22	29	43
8	9	11	14	18	22	25	33	49
9	10	13	16	20	24	28	37	55
10	11	14	18	22	27	32	41	61
11	12	19	20	28	30	35	45	67
12	13	17	22	27	32	38	49	73
13	15	18	23	29	35	41	54	79
14	16	20	25	31	38	44	58	85
15	17	21	27	34	40	47	62	91
16	18	23	29	36	43	51	66	97
17	19	24	31	38	46	54	70	103
18	20	25	32	40	49	57	74	109
19	21	27	34	42	51	60	78	116
20	22	28	36	45	54	63	82	122
21	23	30	38	47	57	66	87	128
22	25	31	40	49	59	70	91	134
23	26	33	41	51	62	73	95	140
24	27	34	43	54	65	76	99	146
25	28	35	45	56	67	79	103	152
26	29	37	47	58	70	82	107	158
27	30	38	49	60	73	85	111	164
28	31	40	50	63	75	89	115	170
29	32	41	52	65	78	92	120	176
30	34	42	54	67	81	95	124	182
31	35	44	56	69	83	98	128	188
32	36	45	58	72	86	101	132	195
33	37	47	59	74	89	104	136	201
34	38	48	61	76	92	108	140	207
35	39	50	63	78	94	111	144	213
36	40	51	65	80	97	114	148	219
37	41	52	67	83	100	117	153	225
38	42	54	69	85	102	120	157	231
39	44	55	70	87	105	123	161	237
40	45	57	72	89	108	126	165	243
41	46	58	74	92	110	130	169	249
42	47	59	76	94	113	133	173	255
43	48	61	78	96	116	136	177	261
44	49	62	79	98	118	139	181	268
45	50	64	81	101	121	142	186	274
46	51	65	83	103	124	145	190	280
47	53	66	85	105	126	149	194	286
48	54	68	87	107	129	152	198	292
49	55	69	88	110	132	155	202	298
50	56	71	90	112	135		206	304

Area, Length, and Volume Conversion Factors

Quantity	From Inch-Pound Units	To Metric Units	Multiply by
Length	mile	km	1.609 344
	yard	m	0.914 4
	foot	m	0.304 8
		mm	304.8
	inch	mm	25.4
Area	square mile	km^2	2.590 00
	acre	m^2	4 046.856
		ha (10 000 m^2)	0.404 685 6
	square yard	m^2	0.836 127 36
	square foot	m^2	0.092 903 04
	square inch	mm^2	645.15
Volume	acre foot	m^3	1 233.49
	cubic yard	m^3	0.764 555
	cubic foot	m^3	0.028 316 8
	cubic foot	cm^3	28 316.85
	cubic foot	L(1000 cm^3)	28.316 85
	100 board feet	m^3	0.235 974
	gallon	L(1000 cm^3)	3.785 41
	cubic inch	cm^3	16.387 064
	cubic inch	mm^3	16.387 064

NEW CONCRETE DESIGNATIONS

New	Previous
Class 2500	Class B
Class 3000	Class A
Class 4000	Class D
Class 4000DS (Drill Shaft)	No Previous Designation
Class 4000S (Seal)	No Previous Designation
Class 4000P (Prestressed)	Class AA
Class 5000	Class X
Class 6000	No Previous Designation
Class 6500	Class E
Class 7000	No Previous Designation

Plan Preparation Guide

Chapter 17

Sediment/Erosion Control Plans

1. Sediment/Erosion Control Plans

There are eight plan sheets that provide sediment/erosion control information for a project. Distinct erosion control items have been designed for use during highway construction on S. C. Highways. Pay items to construct these sediment/erosion control items are described on each drawing. A unique pay item number is available for each item.

2. Sediment Dam and Temporary Sediment Control Structure and Basin

One plans sheet is an Erosion Control Data Sheet that provides information concerning the variable shown on the “Sediment Dam” standard and the "Temporary Sediment Control Structure and Basin” standard. The location of a “Sediment Dam” should be shown on the plan sheet using the elongated diamond in the direction of flow. This symbol can be found in the Department’s cell library. Show the location of the “Temporary Sediment Control Structure and Basin” on the plan sheet with a rectangle with the long dimension in the direction of flow. The Sediment Dam is suggested to be used to control sediment/silt of drainage areas up to ten acres and over. These erosion control items are numbered on the plans, and the numbers are transferred to the Data Sheet. The necessary information is to be provided for each individual item. When showing the sediment dam and sediment basins on plans, it will be necessary to show any additional right of way (permanent) needed to construct these items. This should be done prior to sending the plans to Right of Way. The drawings for both of these basins must be included in the final construction plans with the Erosion Control Data Sheet, as applicable. If there is a need for a temporary sediment control structure that is not shown on the drawing, please contact Road Design Office for a new pays item number. If the structure is not shown on the drawing, then you will need to revise the sheet appropriately to include all of the necessary design information. If comments are needed to be recorded on the Data Sheet, use the line or lines directly under the item being referenced. When any erosion control item is set-up in the plans for discretionary use by the Resident Engineer that the Resident Engineer may need to design in the Field, the soil types shall be provided as described on the “Erosion Control Data Sheet”.

The Sediment Dam may or may not have an excavated silt basin in front of the sediment trap riprap. If it does not, then the variable, “depth of silt basin”, will be zero and “N/A” placed in the length and width boxes. The silt basin may be drained or not drained at the Sediment Dam and must be so noted on the Data Sheet. Side slopes of silt basins may be vertical and should, also, be noted on the Data Sheet. If the outfall channel of a Sediment Dam will not need riprap protection, indicate by placing a zero under “outfall channel length” and “N/A” in the other applicable boxes. See Standard Drawing Numbers 815-2 and 815-6.

See sheet 17-6 for an example of the Erosion Control Data Sheet.

Sediment control structures and basins will be shown in the plans on a special sheet similar to Standard Drawing No. 815-2. Each basin with a sediment control structure will have its own special drawing in the plans. The special drawing will provide site specific information for only that basin and structure such as pipe type and length, slopes, structure size, etc.

The location of the sediment basin with the sediment control structure will be shown on the plan sheet and numbered to match the special drawing sheet showing the details of the basin and structure. The plan sheet will show the additional right of way, fencing, and the specific dimensions of the basin. Right of way for the basin will be shown as station-offsets referenced from the roadway mainline centerline to each intersecting point of the exterior boundary of the basin outside the roadway right of way.

Measurement and payment will be as described in Standard Drawing No. 815-2. The special drawings incorporated into the plans will use Standard Drawing No. 815-2 as a model drawing.

3. Sediment Trap for Catch Basin/Drop Inlet

"Sediment Trap for Catch Basin/Drop Inlet" is to be used in medians and at other selected catch basin/drop inlet locations. It is recommended to handle erosion for up to a ten acre drainage area or a median length and width shown on the standard drawing. This item is shown on two plan sheets. One is for the Piedmont and the other, the Coastal region. When these items are used, the soil types (coarse/fine) must be given on the Data Sheet. Suggested locations for its use should be shown on the plans, if known, and additional quantities may be shown in the inclusions to be used at the discretion of the Engineer. A Sediment Trap is comprised of two pay items, silt basin and inlet structure filter. The silt basin quantity may vary from sediment trap to sediment trap but the estimated quantity of silt basin is not to be placed on the plans at each sediment trap. The total quantity of silt basin will be shown in the inclusions and noted for Sediment Traps. The quantity of silt basin will be for the construction and the estimated clean-out of the basin. It is necessary to know the type of catch basin/drop inlet that is involved and particularly whether or not the catch basin/drop inlet is to be rehabilitated or newly constructed. Sediment Traps are not expected to be used at a curb inlet location. The type of inlet structure filter used in a Sediment Trap will be a Type A or Type B only. The total quantity of Inlet Structure Filters by type will be placed in the inclusions and noted for use in Sediment Traps. See Standard Drawing Number 815-5.

4. Inlet Structure Filters

"Inlet Structure Filters" that are necessary in the construction of a Sediment Trap may also be used alone where protection of the inlet structure is required. There are two types of filters shown on the standard drawing. Use of a certain type of filter may be shown on the plan sheet at each structure needing protection or a quantity may be placed in the inclusions for use at the discretion of the engineer, or both. If Inlet Structure Filters are desired to be used other than

in Sediment Traps, then the two quantities should be placed in the inclusions separately and noted. Cleaning- out the silt in front of an Inlet Structure Filter will be paid for as "Silt Basin" and an estimated quantity should be given in the inclusions. See Standard Drawing Number 815-4.

5. Ditch Checks

Specific locations of each "Ditch Check" is not to be shown on the plans. Locations (Sta. to Sta.) may be given as described below. Where locations are not specified, the quantities will be placed in the inclusions. In most cases, we do not recommend that they be used on final ditch grade unless outside the roadside clear zone and may be left in place. Use of ditch checks in temporary ditches while constructing embankments is recommended. In this case as the embankment is constructed, the riprap will be scattered and abandoned in the fill as permitted. Design information is found on the standard drawing to assist the Field Engineer with the spacing and ditch check height. Therefore, only a total quantity should be placed in the inclusions. When used in a roadside or median ditch on the final grade, the ditch check will normally need to be removed and the area graded and seeded. Cost to remove and dispose of the ditch check is included in its bid price. See Standard Drawing Number 815-3.

6. Rolled Erosion Control Products

Standard Drawing No. 815-1 has been revised to show "Rolled Erosion Control Product" instead of an earthen "Temporary Sediment Dam". Rolled Erosion Control Products should be used in locations where final grade have been constructed and it is necessary to provide protection against erosion. After permanent seeding is accomplished then the Rolled Erosion Control Product is put in place. In some cases, Ditch Checks are recommended in the same locations, so a quantity of Rolled Erosion Control Product and Ditch Check may be given with quantities for each computed using the same locations. When specific locations are not determined, a quantity of each in the inclusions allows the Engineer to decide which method of protection he/she desires. The advantage of the Rolled Erosion Control Product is that it can be left in-place, but the riprap must be removed and disposed of if adjacent to the travelway. These quantities will be shown in the inclusions. Additional quantities may be given in the inclusions where locations have not been determined. See Standard Drawing Number 815-1. Quantity and location of Erosion Control Blankets and Permanent Turf Reinforced Mats (RECP's) will no longer be placed on the plan sheet. Sediment Dams will still need to be shown and numbered on the plan sheet matching the number and location of the ECDS but will be shown on the inclusion sheet. Please see page 3-11 for a listing of Rolled Erosion Control Product pay items.

7. Silt Fence

"Silt Fence" is found on Standard Drawing No. 815-1. The location of this item will not be shown on the plans. The quantity estimated will be placed in the inclusions.

8. Baled Straw/Sediment Tubes/Curb Inlet Filters

The use of baled straw is no longer an acceptable sediment or erosion control method. Baled straw should not be placed in the quantities in future projects.

In lieu of Baled Straw, Sediment Tubes (Standard Drawing No. 815-7) may be used in both curb and gutter sections and ditch sections. The use of Sediment Tubes is more defined than Baled Straw, but can be used in any condition where concentrated flows need to be filtered. Typically, Sediment Tubes come in 10-foot lengths and can be sewn together, end-to-end, in the field. Computation of the quantity of Sediment Tubes is by the linear foot in increments of 10 linear feet installed as shown on the Standard Drawing. Twelve inch diameter Sediment Tubes are to be specified in front of catch basins to filter run-off going into the catch basin weep hole. The Sediment Tube can be placed on the subgrade, graded aggregate base or the asphalt plant mix. In all cases, the tube has to be staked or stabilized. Generally, only one 10-foot section will be needed at a catch basin.

Twenty inch diameter Sediment Tubes are generally specified for ditch protection. Standard Drawing No. 815-7 gives the details on a typical ditch installation; however, the number and spacing of these installations will be dependent on the grade of the ditch and the volume of expected flow. The Hydraulic Section should provide this information on a case-by-case basis.

Sediment Tubes may be shown in the inclusions on the "Construction Note Sheet". Explanations should accompany the pay items added to the inclusions to describe where the designer intends the Sediment Tubes to be used. When specifying the use of the 20-inch diameter Sediment Tubes, the designer may have to show the spacing and locations of the tubes. When the Sediment Tube is shown on the plan sheet, it should be labeled with the quantity and not placed in the inclusions.

Curb Inlet Filters may be added to the plans where filtration of storm water run-off before it enters the catch basin is desired. The Curb Inlet Filter is laid in the gutter in front of the catch basin covering the throat as shown in Standard Drawing No. 815-7. The designer will determine the quantity by each Curb Inlet Filter needed for each type curb-style catch basin. In general, the Curb Inlet Filter will only be used on catch basins Type 16, 17, and 18.

9. Temporary Slope Drains

"Temporary Slope Drains" may be used but their locations, also, are not shown on the plans. Place the estimated quantity in the inclusions. There is no standard drawing that details "Temporary Slope Drains".

Other erosion control items are available as shown on Standard Drawing 815-1 and other special drawings that are to be included in the plans.

10. Erosion Control Data Sheet

Certain information is needed in the plans to enable the construction personnel to successfully complete the erosion control responsibilities of the project. That information is provided on the Erosion Control Data Sheet (ECDS) which is determined by the Hydraulic Engineering Section. The layout of the ECDS is shown on the following page.

In the future, the Hydraulic Engineering personnel will provide ECDS on an Excel spreadsheet formatted to be input to a MicroStation ECDS border sheet by Road Design personnel. The ECDS border sheet is named ecds_border.dgn. The Excel spreadsheet may be provided over the network or sent via email. Keep the Excel ECDS file in your project files. If changes are needed, the Excel file can be changed which will automatically update the MicroStation file. A tutorial has been created to show how to place the Excel file on the MicroStation border sheet. It can be found on the CADD Support page under Documentation on the Road Design intranet web page.

Only Sediment Tubes, 20” diameter, to be used in ditches will be shown on the ECDS. Location on the plan sheet is not necessary, unless needed for clarity. The 12” diameter Sediment Tubes are not to be shown on the ECDS.

Additional quantities of erosion control items may be placed in the inclusions. A description of the intended use of each inclusion item should be as specific as possible.

EROSION CONTROL DATA SHEET

FED.RD. DIV.NO.	STATE	COUNTY	FILE NO.	ROAD/ROUTE NO.	SHEET NO.
3	SD.				

RECEIVING WATERS

OUTFALL DITCH STATION	SIDE	NAME OF RECEIVING WATERS	NAME OF ULTIMATE RECEIVING WATERS	OUTFALL DITCH STATION	SIDE	NAME OF RECEIVING WATERS	NAME OF ULTIMATE RECEIVING WATERS

SOIL TYPES

ROAD / ROUTE	STATION TO STATION		SOIL PARTICLE SIZE (COARSE / FINE)	ZONE

TEMPORARY EROSION CONTROL BLANKET

ROAD / ROUTE	STATION TO STATION		SIDE	DEPTH OF BLANKET (FT)	SLOPES @ : 1 FRONT	SLOPES @ : 1 BACK	DITCH BOTTOM WIDTH (FT)	CLASS	CLASS A (MSY)	CLASS B (MSY)	CLASS C (MSY)
								TOTALS			

SEDIMENT DAM

NOTE: NO INCISEMENT IS NEEDED IN ANY OF THE DITCHES

NO	STATION	SIDE	DRAINED OR NOT DRAINED	LENGTH OF SILT BASIN	WIDTH OF SILT BASIN	DEPTH OF SILT BASIN	SIDE SLOPE OF SILT BASIN	SPILLWAY WIDTH	SPILLWAY DEPTH	TOTAL HEIGHT TO SPILLWAY	SEDIMENT STORAGE VOLUME	RUNOFF STORAGE VOLUME	OUTFALL CHANNEL WIDTH	OUTFALL CHANNEL DEPTH	OUTFALL CHANNEL LENGTH

Plan Preparation Guide

Chapter 18

QUALITY CONTROL / QUALITY ASSURANCE

NOTE: DUE TO FREQUENT CHANGES TO THE CHECKLIST (PAGES 18-12 THROUGH 18-36), USERS SHOULD OBTAIN THE MOST CURRENT EDITION FROM THE FOLLOWING WEB SITE
www.dot.state.sc.us/doing/QC_docs.html

QUALITY CONTROL/QUALITY ASSURANCE FOR ROADWAY PLANS

Quality Control for Roadway Plans will be performed in accordance with Engineering Directive Memorandum PC-27, " Quality Control/Quality Assurance of Road Plans "; this procedure describes the quality control/quality assurance review of roadway plans prepared by Road Design. Plans are to be reviewed for design, accuracy of quantities, presentation of information, and compliance with guidelines, policies and procedures as adopted by the department. Design Services Group has compiled a summary of quality control reviews for roadway plans.

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION

ENGINEERING DIRECTIVE MEMORANDUM

Number: PC-27

Subject: QUALITY CONTROL/QUALITY ASSURANCE OF ROAD PLANS

This procedure describes the quality control/quality assurance review of road plans prepared by Road Design and by engineering consultant firms. Plans are to be reviewed for design, accuracy of quantities, presentation of information, and compliance with guidelines, policies, and procedures as adopted by the Department. Reviews will be made of the Design Plan Field Review plans, right of way plans and construction plans. Upon special request, reviews may be made at other stages of plan development.

For right of way and construction plans developed by Road Design, the review process begins in the design group with the Design Group Coordinator. One of the Project Facilitators then reviews the plans before submitting to the Design Services Group whose task is to perform a complete quality control review. The plans are then sent to the Hydrology Section on the way to the Program Manager, then to the Project Development Engineer. The plans are sent back to Road Design for a final review by the Road Design Engineer. Right of way plans and construction plans are mailed at prescribed times to the appropriate District Engineering Administrator for a review. While the plans are in the District both construction and maintenance personnel should take the opportunity to review the plans in respect to each of their areas of expertise. Design Plan Field Review plans will not follow the above process, but will be sent to the Design Services Group at the same time that Design Plan Field Review plans are sent to the Program Manager for the field review. After the Design Services Group's review of the Design Plan Field Review plans, their comments will be sent to the Program Manager and design group for action. Fast Track Bridge road plans and other priority projects should be reviewed and processed as quickly as possible.

Consultant prepared road plans will be reviewed by the consultant's quality control process at the Design Plan Field Review, right of way and construction phases prior to submittal to the Department. The consultant's in-house quality control procedures should be on file in the Design Services Group for each specific project involving road plans. Plans are to be submitted by the consultant to the section in the Department that is responsible for hiring the consultant. A review by that section should first be done to determine if the consultant's plans are in compliance with the terms of the agreement. Road plans should then be sent to the Design Services Group for a quality assurance review. This review does not relieve the consultant of the responsibility for the accuracy, design, or compliance with guidelines, policies and procedures required by the

Department. After the Design Services Group's review, the right of way and construction plans will follow the same process as the Department's prepared road plans. Comments are to be returned to the consultant through the section engaging the consultant. Design Plan Field Review plans will be given to the Design Services Group prior to the field review. Comments from the Design Services Group will be returned to the consultant on the field review or within ten days thereafter.

A descriptive outline and a flow chart of each plan review process are attached. Also attached are checklists of the quality control review for Design Plan Field Review plans, right of way plans and construction plans.

Approved: _____
Director of Preconstruction

Effective Date: March 1, 1995

Quality Control/Assurance
Review Process for SCDOT Road Plans

The following review processes are performed to insure all Department's policies; procedures, specifications and standards are followed for construction of SCDOT roadways. A flow chart of each process is attached.

(A) SCDOT Plans (See Flow Chart A)

All road projects except rehabilitation projects will have Design Plans Field Review reviewed by the Design Services Group concurrently with the field review. Designs not meeting the Department specified criteria and policies will be noted and sent to the Design Group and to the Program Manager for action. The Program Manager will obtain a "design exception" or determine necessary revisions.

All Right of Way and Construction plans prepared by Department should adhere to the following quality control procedure.

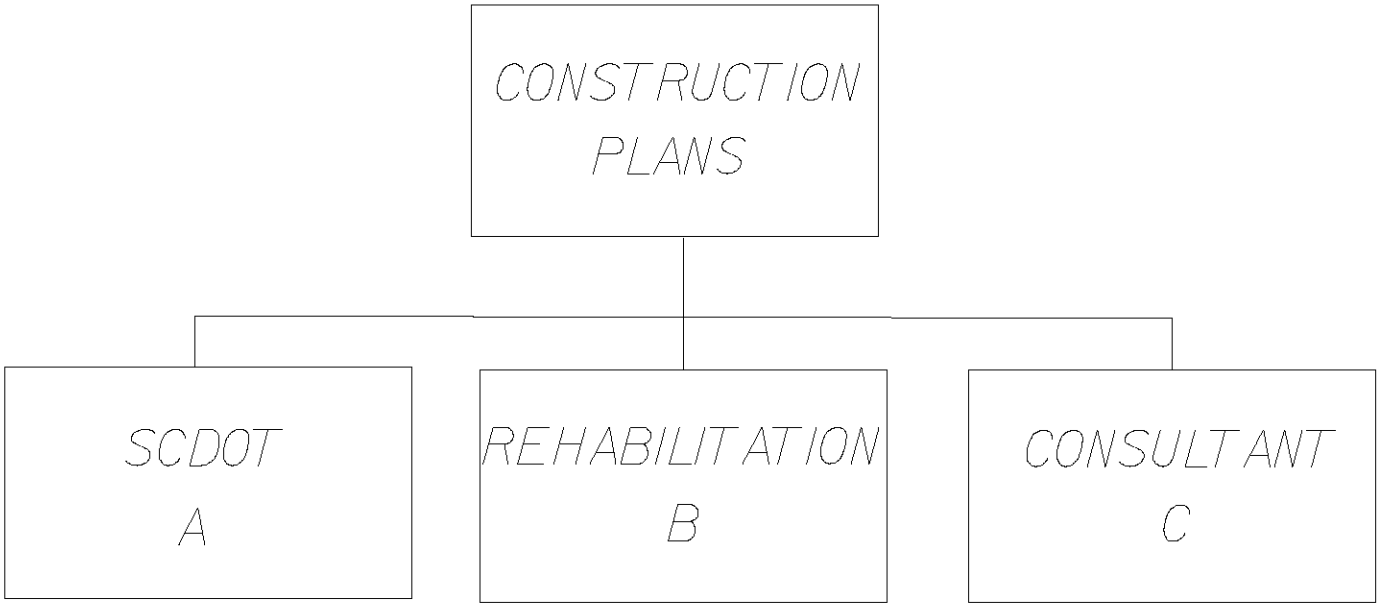
(A1) Design Group Coordinator	Responsible for preparing construction plans after receiving all necessary information from Program Managers and other Departmental support staff. Assembles plans to meet all Department policies, procedures, specifications and standards. Reviews plans for correct design, right of way (existing and new), and estimated quantities. Performs Design Plans Field Review so as to make final revisions to design and other plan information. Also reviews and completes revisions to plans.
(A2) Project Facilitator	Responsible for seeing that plans are prepared and reviewed for accuracy and completeness. Responsible for meeting right of way and letting obligation schedules with plans. Also reviews revisions to plans.
(A3) Design Services Group	Performs final quality control. Reviews plans for accuracy, completeness, policies, procedures, specifications and standards.

(A4) Hydraulic Engineer	Performs final quality control of Hydraulic Design and NPDES.
(A5) Program Manager	Reviews plans for completeness, meeting design policies and property owner input.
(A6) Program Development Engineer	Reviews plans for completeness and meeting design policies.
(A7) Road Design Engineer	Reviews plans for completeness and meeting design policies. Also receives and reviews comments and revisions of plans. Directs comments and revisions for appropriate action.
(A8) Operations/Project Facilitator	Reviews plans' estimated quantities for completeness and checks for correct pay item numbers in preparation for letting. Directs plans to District Engineering Administrator, Director of Rights of Way, and Federal Highway Administrator (FHWA) for review. All comments are sent back to Road Design for action. FHWA Major Revisions are sent to the Program Manager for review. In addition, reviews requested plan revisions before sending back to the Design Group. May make minor changes to plans if deemed appropriate.
(A9) District Engineering Administrator	Reviews plans for constructability, completeness of design information, and omission of quantities.
(A10) Director of Rights of Way	Checks rights of way and property lines against county courthouse and Department records. Notes revisions of moving items, demolition items, and other property owner information. Advises Road Design of any design revisions due to right of way negotiations.
(A11) Federal Highway Administration	On National Highway System projects only, reviews plans for completeness and compliance with specifications and guidelines.

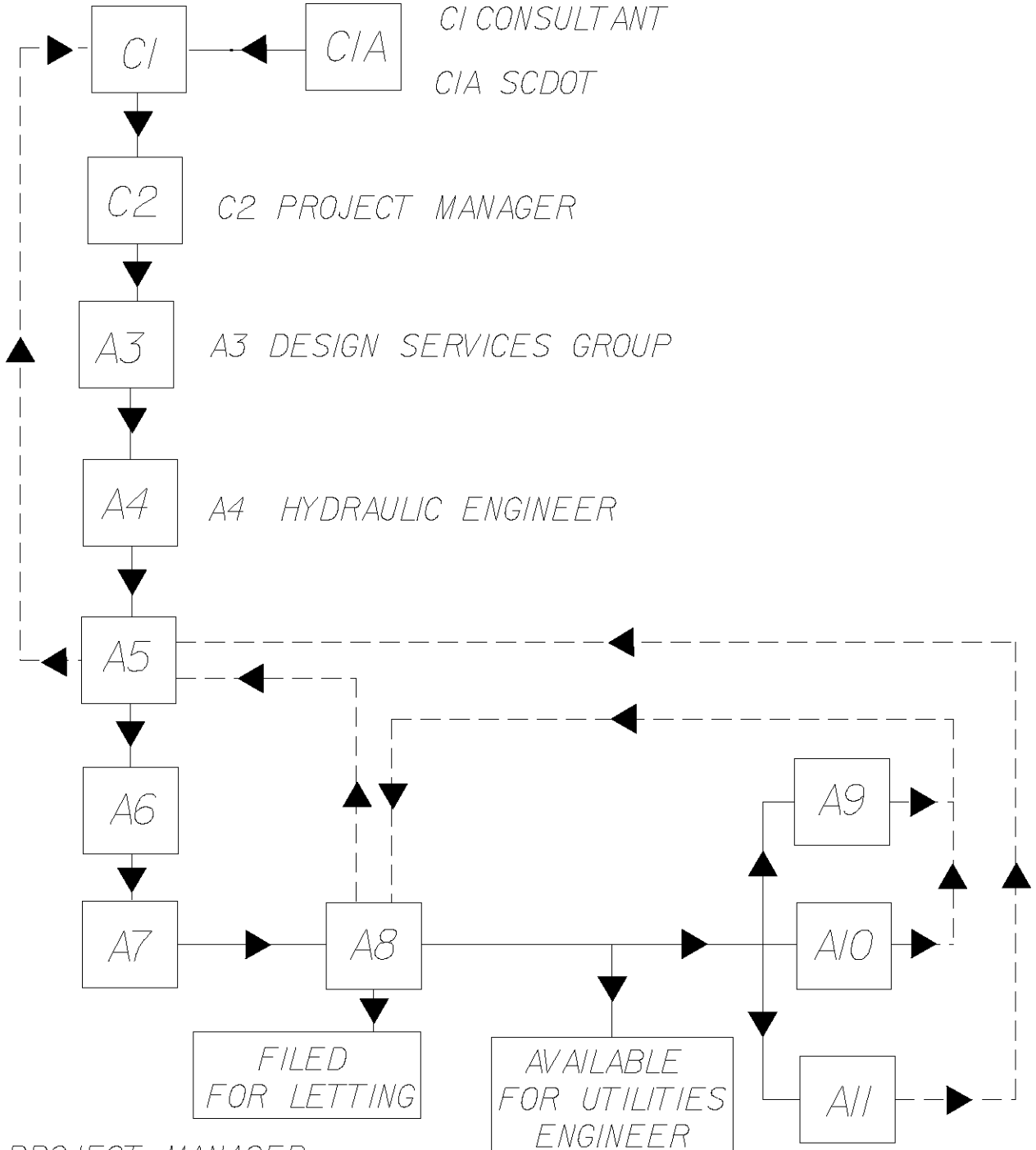
(B) Rehabilitation Plans **(See Flow Chart B)**	Rehabilitation projects that are federally funded Rehabilitation projects. No right of way plans are needed for these types of projects.
(B1) District Engineering Administrator	Compiles all necessary data for Rehabilitation projects throughout District. Follows standards, procedures and practices for all projects. Assists in Preparing necessary items for strip map plans. Reviews items for completeness and adequate quantities.
(B2) Program Manager	Prepares project authorization request and project planning report. Reviews cost estimates and directs District strip maps and quantities to Design Service Group. Determines which roads are to be in contracts with Districts' assistance. Performs Design Plans Field Review
(B3) Design Services Group	Prepares strip map plans to meet all standards, specifications, policies and procedures of Department and FHWA. Performs Design Plans Field Review so as make final revisions to design and other plan information. Finalizes plans for letting including information from field review.
(B3a) District Engineering Administrator	Performs Design Plans Field Review with Design Services Group and Pavement Design Engineer.
(B4) Road Design Engineer	Reviews plans for completeness and conformance with design standards.
(B5) Operations/Project Facilitator	Directs plans to FHWA for review. Also reviews any revisions of plans for construction. Sends copy of final plans to District Engineering Administrator for review and comments.

(B6) District Engineering Administrator	Perform final quality control review for constructability and estimated quantities.
(B7) Federal Highway Administration	Reviews plans for compliance with federal policies and procedures.
(C) Consultant Plans **(See Flow Chart C)**	Performs Quality Assurance process to insure all Department's policies, procedures, specifications and standards are followed in the preparation of plans for construction of Department roadways. Consultant certifies to the Department that plans are incompliance with all Departmental policies, procedures, specifications and standards.
(C1) Consultant	Assembles plans to meet all policies, specifications, procedures and standards set by the Department using quality control criteria throughout plan preparation. Consultant to provide to the Department their detailed quality control process for each project. Consultant should have completed their reviews prior to each stage submittal to the Department.
(C1a) Department	During assembly of plans, Program Manager and Design Services Group will oversee preparation of plans by reviewing and commenting on plan submittals at predetermined stages of completion. In addition, the Program Manager and a member of the Design Service Group participate on Design Plans Field Review.
(C2) Program Manager	Consultant submits plans to the Program Manager who reviews them for compliance with scope of work; then, directs plans to Design Services Group to begin final Department quality assurance review process. Review procedure follows Department's quality control process beginning at Design Services Group level (A3) and proceeds through a similar process as Department prepared plans. See Flow Chart 'A'.

QUALITY CONTROL/QUALITY ASSURANCE PLAN REVIEW PROCESS FOR SCDOT



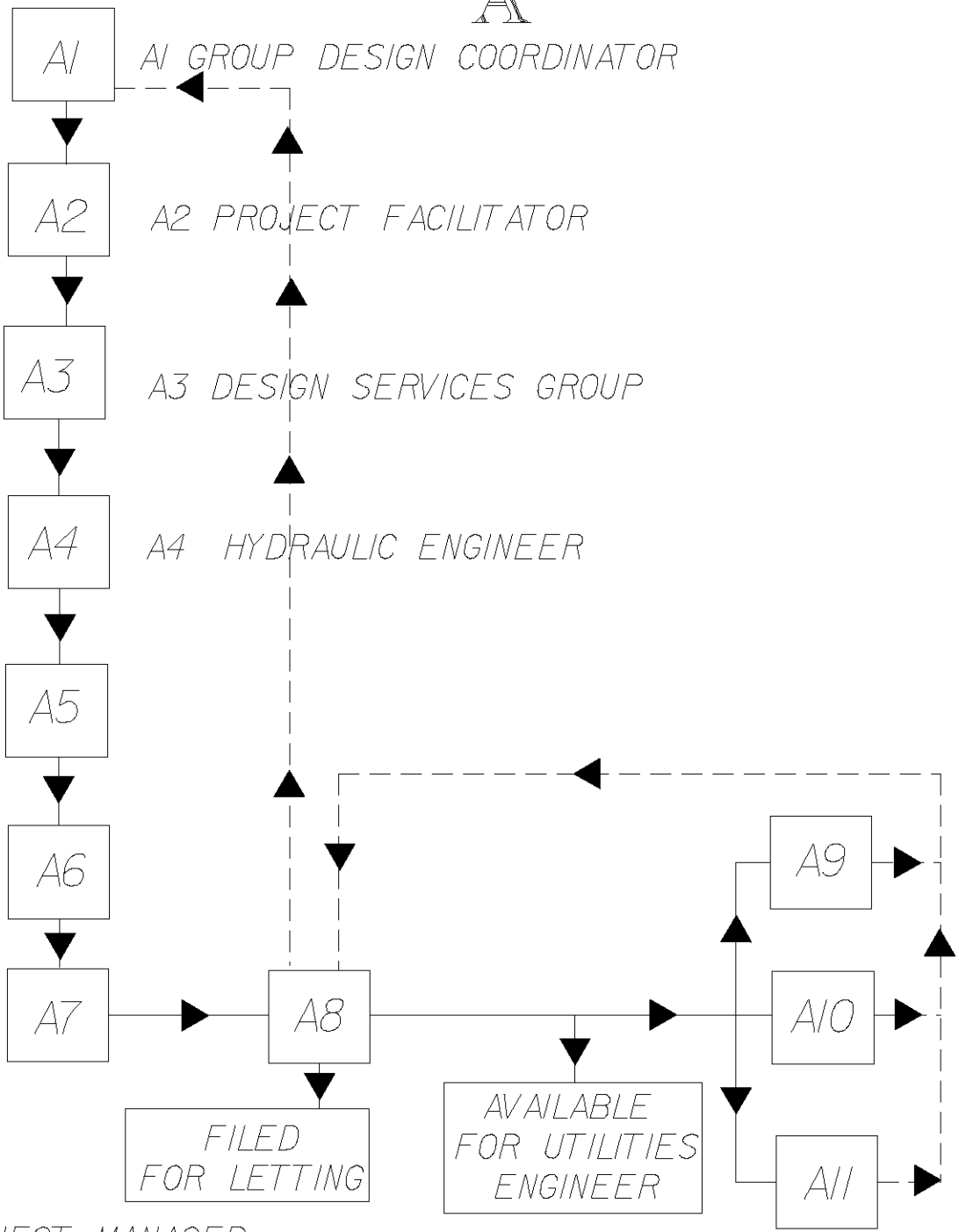
CONSULTANT PLANS
C



A5 PROJECT MANAGER
A6 PROGRAM DEVELOPMENT ENGINEER
A7 ROAD DESIGN ENGINEER
A8 OPERATIONS/PROJECT FACILITATOR
A9 DISTRICT ENGINEERING ADMINISTRATOR
A10 DIRECTOR OF RIGHTS OF WAY
A11 FEDERAL HIGHWAY ADMINISTRATION

NOTE:
DASHED LINE DENOTES REVISION PROCESS. AFTER REVISIONS, PLANS WILL BE RECHECKED IN NORMAL PROCEDURE.

S.C.D.O.T.
CONSTRUCTION PLANS
A



A5 PROJECT MANAGER
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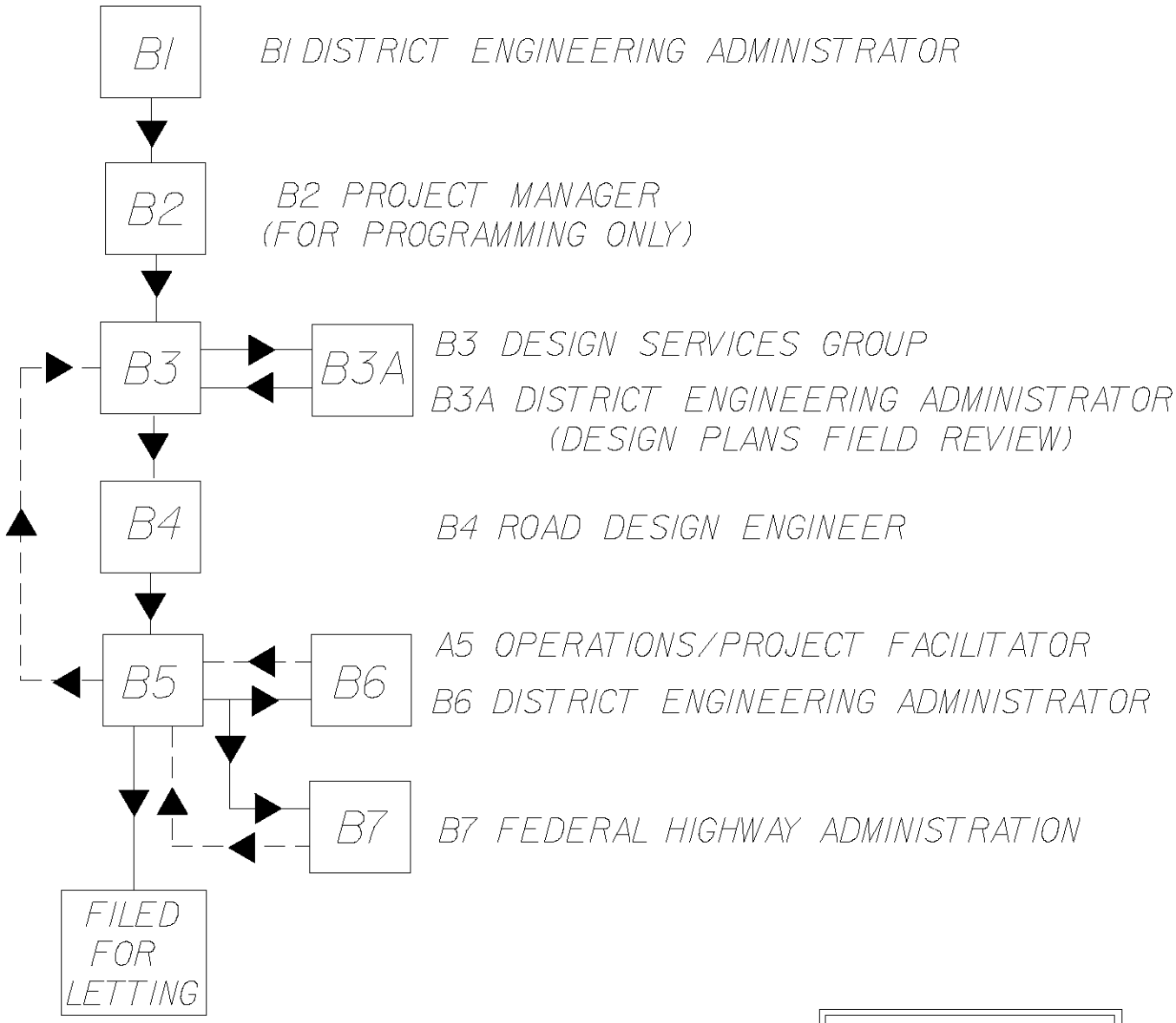
A10 DIRECTOR OF RIGHTS OF WAY
A11 FEDERAL HIGHWAY ADMINISTRATION

NOTE:
DASHED LINE DENOTES REVISION PROCESS. AFTER REVISIONS, PLANS WILL BE RECHECKED IN NORMAL PROCEDURE.

FEDERAL AID REHABILITATION PLANS B



NOTE:
DASHED LINE DENOTES REVISION PROCESS. AFTER REVISIONS, PLANS WILL BE RECHECKED IN NORMAL PROCEDURE.

Quality Assurance of Design Field Review Plans

The procedure below describes the quality assurance (QA) review of Design Field Review Plans prepared by Road Design for all projects with the exception of 'C' funded or partly funded projects.

Design Field Review (DFR) Plans are to be reviewed by the Design Services Group for design and compliance with guidelines, policies, and procedures as adopted by the Department. A copy of the QA review checklist is listed below.

DFR Plans are to be delivered by the Design Group to the Design Services Group five working days prior to the date of the scheduled design field review. Upon completion of the Design Services Group's review of the DFR Plans, the Design Services Group's comments will be returned to the Design Groups for revisions, if any, that may need addressing.

The review of the DFR plans will be done during the same time the DFR is being performed. The QA review of the DFR is not to delay or interfere with the scheduling and/or completing the DFR.

Design Field Review Plan
Revised January 28, 2004

Index:
HDM – Highway Design Manual
IB – Instructional Bulletins
PPG – Plan Preparation Guide

DESIGN FIELD REVIEW PLANS
(30% COMPLETE)

QUALITY ASSURANCE REVIEW

County: _____ Road/Route: _____ PIN: _____

Design Group No.: _____ - Secondary/Primary (Circle one)

Consultant: _____

Reviewed By: _____ _____ _____ _____
Initials **Begin Date** **End Date** **Let Date**

I. CHECK PPMS DATA

- ❑ A. Project Identification Number (PIN)
- ❑ B. County
- ❑ C. File Number
- ❑ D. Project Number
- ❑ E. Road/Route Number(s)

II. TITLE SHEET

- ❑ A. Correct Reference Title Sheet for Project (dfrts2.dgn PER IB 2003-2)
- ❑ B. Location / Description
- ❑ 1. Check Map against Description.
- ❑ 2. North Arrow
- ❑ 3. Location Map Labels (.....County or Town/City of.....)
- ❑ C. Traffic Data (year 2002)
- ❑ D. Check Beginning and Ending Stations Notes on Location Map Agree with:
- ❑ 1. Plans/ Profiles
- ❑ 2. Project area clearly highlighted on map.

III. DESIGN EXCEPTIONS

- ❑ A. Pre-Construction Report Items
- ❑ 1. Design Speed (HDM 11.2.5)
- ❑ 2. Horizontal Alignment (HDM CHP. 11)
- ❑ 3. Vertical Alignment (HDM CHP. 12)
- ❑ 4. Vertical Clearance (HDM 19.3.2)
- ❑ 5. Grade (HDM CHP. 12)
- ❑ 6. Bridge width (HDM 13.5.1)
- ❑ 7. Superelevation (HDM CHP. 11)
- ❑ 8. Cross Slope (HDM 13.2.3)
- ❑ 9. Lane width (HDM 13.2.2)
- ❑ 10. Shoulder width (HDM 13.2.6)

- 11. Stopping sight distance (HDM 10.1.3)
- 12. Structural Capacity of Bridges (HDM 9.2.2)
- 13. Horizontal clearance (HDM 11.2.7)
- B. Copy of "Request for Approval of Design Exceptions", if applicable (HDM 9.2.3)

RIGHT OF WAY PLANS

(70% COMPLETE)

QUALITY CONTROL/ASSURANCE REVIEW

___ PRELIMINARY ___ FINAL

County: _____ Road/Route: _____ PIN: _____

Design Group No.: _____ - Secondary/Primary (Circle one)

Consultant: _____

Reviewed By: _____ _____ _____ _____
Initials **Begin Date** **End Date** **Let Date**

Forwarded to Hydrology Group : _____ On: _____ By: _____

I. CHECK PPMS DATA:
— A. Project Identification Number (PIN)
— B. County
— C. File Number
— D. Project Number
— E. Road/Route Number(s)

II. COVER
— A. Project Identification Number (PIN)
— B. County and County Number Agree
— C. File Number
— D. Project Number
— E. Road/Route Number(s)
— F. From/To Description
— G. Design Group Initials

III. TITLE SHEET (Sheet 1 OR Sheet 1A if to be bound w/Const. Plans)
— A. Correct Reference Title Sheet for Project
— B. Index with Subtotals and Total Sheets
Note: Show Sheet 1 “omitted” in Index if Title Sheet No. 1A is used
Also sheets 2, 5, TC series & PM Series “omitted” for R/W Plans
C. Project Identification Box
— 1. Project Identification Number (PIN)
— 2. County
— 3. File Number
— 4. Road/Route Number
— 5. Sheet Number (“1” OR “1A” per III B Note)
— 6. Total Sheets
D. Location / Description
— 1. Check Map against Description
— 2. North Arrow
— 3. Location Map Labels (.....County or Town/City of.....)
— a. Fill out town / city approved by box (cross out in not in town / city)

— E. NPDES Data
— F. Longitude and Latitude
— G. Railroad Involvement Indicated
— H. Traffic Data
I. Check Beginning and Ending Stations
1. Notes on Location Map Agree with:
— a. Typical Sections
— Plans
— Profiles
— Cross Sections
— b. Include arrows indicating “Begin” and “End” of project survey(s)
— c. Project area clearly highlighted on map
2. Include notes for bridges/culverts and notes for exceptions Agree with:
— Typical Sections
— Plans
— Profiles
— Cross Sections
J. Check Length of Project
— 1. Show Length(s) in Thousandths (Three Decimal Places)
— 2. Show mileage for each mainline survey (sideroads, connectors. ramps, etc.)
— 3. Show total mileage if multiple roads/lines
— 4. Check for Exceptions for Roadway.
— 5. Show equalities in stationing
— a. Agrees with Plans
— b. None
6. Check for Bridge/Structures Over 6.1 m (20’) In Length
— a. Included in plans
— b. Note: "Bridge plans bound under separate cover"
— K. Group Coordinator's Initials and Date
— L. Project Facilitator’s Initials and Date
— M. Standard Drawing & Specification Note - Date 1986 (Or Latest Edition)
— N. Design Group No./Group Coordinator Initials & Initials of Preparer
O. Check for correct Seal on Title Sheet
— 1. "Signature only" Required by Eargle for "C" Projects. Sealed by Williamson
— 2. In addition to Eargle's Seal check Program Development map legend for correct Seal (Rocque Kneece or John Walsh) on STP, BRT, Etc. Projects.

IV. MOVING ITEMS and REMOVAL & DISPOSAL ITEMS
— A. Not Required per Project Manager
B. Included
— 1. Location
— 2. Description
— 3. Owner
— 4. Work To Be Done
C. Project Identification Box
— 1. County
— 2. File Number
— 3. Road/Route Number
— 4. Sheet Number

V. TYPICAL SECTION (S) (Sheet 3)

__ A. Check against Pavement Design and/or Field Review Recommendations
— 1. Widths and Thickness/Rates of Materials
__ a. Agrees with plans and x-sections
— 2. Pavement Legend
— 3. Materials/Rates per Current PPG Guidelines
— 4. Alternate Aggregate Bases Shown (if required) - note: not to be used in areas with 6' or less width.
— B. "NTS" If Not To Scale
— 1. Vertical Dimensions agrees with plans
— 2. Horizontal dimensions agrees with plans
C. Drawn to Scale
— 1. Vertical Dimensions agrees with plans
— 2. Horizontal dimensions agrees with plans
— 3. Slopes
D. For "variable" Widths Show
— 1. Variation (example: Variable 1.5 to 7.0)
— 2. Dimension Shown on Typical Section (example: Shown 5.5)
E. For "variable" Slopes, Show
— 1. Variation (6:1 to 2:1)
— 2. Slope Shown on Typical Section (shown 4:1)
— 3. Fill Height at each Slope Change
— F. Inclusive of Beginning/Ending Stations of Project
— 1. Notes To Cover Areas Not Represented In Typical Stations
— G. Point of Grade Indicated
H. Design Speed Block (Horizontal)
— 1. Completed
— 2. Exceptions Noted
I. Other Notes/Details
— 1. Re: Applicable Standard Drawings
— 2. Re: Guardrail
— 3. Re: Curb & Gutter/Sidewalk
— 4. Necessary Detail Drawings
— J. Ditch note allowing variable ditch where applicable
K. Project Identification Box
— 1. County
— 2. File Number
— 3. Road/Route Number
— 4. Sheet Number
L. Lane Width
— 1. Agrees with Plans
— M. Shoulders - 3.5' for guardrail

VI. RIGHT OF WAY DATA SHEET (Sheet 4)

A. Tract Numbers
— 1. Agree with property Strip Map
— 2. Agree with Plans
B. Owner(s)
— 1. Agree with property Strip Map
— 2. Agree with Plans
— C. Tax Map Reference

D. Tract Total
— 1. Hectares and (Acres) or square meters and (square feet) per Right of Way Instrument
— D. Obtain in square meters and (square feet) and hectares and (acres)
— E. Remain in Hectares and (Acres)
— 1. If equal to or less than 0.1 Hectare (0.25 acres) show remain in square meters (square feet)
— F. Date Acquired
G. Permissions Noted
— 1. Outfall Ditches
— 2. Slope
— 3. Drainage Structures
— 4. Erosion Control
— 5. Entrance
H. Project Identification Box
— 1. County
— 2. File Number
— 3. Road/Route Number
— 4. Sheet Number

VII. PROPERTY STRIP MAP (Sheet 4A)
— A. Tracts Numbered
— B. Owner
— C. Clearly Note Present and New Right of Way
— 1. Agrees with Plans
D. Project Identification Box
— 1. County
— 2. File Number
— 3. Road/Route Number
— 4. Sheet Number

VIII. GENERAL CONSTRUCTION NOTE (Sheet 5)
— A. Omitted for R/W Plans

IX. REFERENCE DATA SHEETS (Sheet 5A, 5B, etc.)
A. Plan Data
— 1. Control Points
— 2. Reference Points
__ 3. Curve Data
— a. Superelevation per Std. 100-6
__ 4. Benchmarks
— a. Description
— b. Elevation
— c. Datum (Assumed, NAVD-88, Or NGVD-29 Per Instructional Bulletin 96-3)
— 5. Curb Grade Profile Data
B. Project Staking Data
— 1. Curves Numbered to Agree with Plans
C. Plan Sheet Layout Diagram
— 1. Agrees with Plans
— 2. Match Lines & Stations
— D. Relocation Control Points Per Instructional Bulletin 97-10

E. Project Identification Box
— 1. County
— 2. File Number
— 3. Road/Route Number
— 4. Sheet Number

X. FIRST PLAN SHEET
A. Right of Way Note(s) for Present R/W
— 1. File/Docket/Project Number
— 2. Date
— B. Utility Notes
— C. All Items in Section XII Below

XI. ALL PLAN SHEETS
A. Project Identification Box
— 1. County
— 2. File Number
— 3. Road/Route Number
— 4. Sheet Number
— B. North Arrow
— 1. Bearing(s) on all Centerline Tangents
— C. Begin/End Notes
D. R/W Data
— 1. Show Property Lines
— 2. Tracts numbered
— 3. Property owners
— 4. Give Pluses for Shifts and at Beginning and End of Tapers for New R/W.
— 5. Label R/W at Beginning and End of each Plan Sheet.
— 6. Label R/W at Breaks/Shifts for New R/W.
— 7. Label sight Areas (see P.P.G. page 12-7)
— 8. Label Moving Items per Project Manager
— 9. Label Removal and Disposal Items per Project Manager.
__ 10. Label "Obtain permission"
— a. Ditches Beyond Right of Way Limits.
— b. Entrances
— 1. Beyond Right of Way Limits
— 2. Relocated Due New Construction/Alignment.
— c. Pipe/Drainage Structures Beyond Right of Way Limits.
E. Show Travelway Widths
— 1. Beginning & End of Each Sheet.
— 2. Beginning and End of Tapers
— a. Give Pluses at Beginning and End.
— 3. Radii at Intersections per Face of Gutter/Edge of Pavement
__ 4. Medians Labeled & per Std. 100-8
— F. Construction Lines Plotted and labeled (cut / fill)
— G. NPDES Lines Plotted.
— H. New Guardrail plotted - use only after all other options are considered
— I. Special Notes
J. Drainage - Pipe and Structures
— 1. Per Hydrology Study or Field Review Recommendations.
— K. Label Control of Access
— L. Utility Information provided by Surveys (Including alignment, elevations, etc.).
— M. Symbology as per STD 100-8

N. Design:
— 1. Travelway Widths and Lane Widths
— 2.Turning Radii (meets design)
— 3. Sight Distances (Stopping)
— 4. Lane Alignment
— 5. Design Speed
— O. Relocation Notes
— P. Plotted For Readability at 50% reduction.

XII. PROFILE SHEETS
— A. Begin and End Notes
B. Grade Line
— 1. Percent of Grade
— 2. Vertical Curves
— a. PI Station and elevation
— b. Lengths
— c. Design speed(s) for Federal Aid projects
— 3. Percent of Grade
— a. Check for minimum or maximum grade
— Ditch Section 0.10%
— Curb and Gutter 0.30%
— Valley Gutter 0.40%
— 4. Exceptions Noted
— 5. Equalities in stationing plotted.
— C. Special Ditches (Noted Only)
— D. Proposed Outfall Ditch Grades
— E. Elevations
— 1. P.C. s
— 2. P.T. s
— 3. Percent of Grade Shown
— 4. Type of Gradeline Noted (Finished, Subgrade, Spline).
— 5. Agrees with X-Sections.
— F. Vertical Design (Sight Distances)
— G. Vertical Clearances (Bridges, Overpasses, Trees etc.)
— 1. Structure Stations.
— 2. Toe of fill.
— H. All information shown can be readable at 50% reduction.
I. Project Identification Box
— 1. County
— 2. File Number
— 3. Road/Route Number
— 4. Sheet Number

XIII. EROSION CONTROL PLANS
— 1. Need Erosion Control Data sheet if N.P.D.E.S. is over 5.0 Acres

XIII. CROSS SECTIONS
NOTE: If Cross Sections Are Bound Separately, Check Cross-Section Cover per Section II of Checklist (include a copy of title sheet)
— A. Begin/End Notes
— B Exception Notes
— C Equality in Stationing Notes
— D. Agrees with Typical Section

E. S. E. Notes
— 1. Beginning and Ending
— 2. Maximum
— 3. Not required on Curb and Gutter Sections.
F. Bridge Notes
— 1. Begin and End of Bridge
— 2. Toe of Fills
G. Project Identification Box
— 1. County
— 2. File Number
— 3. Road/Route Number
— 4. Sheet Number
— 5. Sheet Number (X1- __)

CONSTRUCTION PLANS

BOUND WITH COMPLETED R. /W. PLANS
QUALITY CONTROL / ASSURANCE REVIEW
__ PRELIMINARY __ FINAL

County: _____ Road/Route: _____ PIN: _____

Design Group No.: _____ Secondary/Primary (Circle one)

Consultant: _____

Reviewed By: _____ _____ - _____ _____
Initials **Begin Date** **End Date** **Let Date**

Forwarded to Hydrology Group : _____ On: _____ By: _____

I. CHECK PPMS DATA
— A. Project Identification Number (pin) and Item Number
— B. County
— C. File Number
— D. Project Number
— E. Route / Road

II. TITLE SHEET (Sheet 1)
— A. Index with Subtotals and Total Sheets
— 1. Sheet 1a for R/W Title sheet (For Information Only)
— B. Project Identification Box
— 1. Project Identification Number (PIN)
— 2. Total Sheets
— 3. File and Project Numbers
— 4. Route / Road
— C. Check Beginning and Ending Stations agrees with Typical, Plans, Profile, Cross -Sections.
— 1. Notes on Location Map
— a. Include notes for Bridges/Culverts and notes for exceptions
— D. Check Length of Project
— 1. Show Length(s) in Thousandths (Three Decimal Places)
— 2. Show mileage for each mainline survey (sideroads, connectors. ramps, etc.).
— 3. Show total mileage if multiple roads/lines.
— 4. Check for Exceptions for Roadway.
— 5. Show equalities in stationing:
— a. Agrees with Plans
— b. None
6. Check for Bridge/Structures Over 6.1 m (20’) In Length.
— a. Included in plans

II. TITLE SHEET (continued)

— b. Note: "Bridge plans bound under separate cover".

— E. Group Coordinator Initials and Date

— F. Project Facilitator's Initials and Date

— G. Design Group No./ Design Group Coordinator Initials, & Initials of Preparer

H. Check for correct Seal on Title sheet

— 1. "Signature only" Required by Eargle for "C" Projects Sealed by Williamson

— 2. In addition to Eargle's Seal check Program Development map legend for correct Seal (Rocque Kneece or John Walsh) on STP, BRT, Etc. Projects.

III. SUMMARY OF ESTIMATED QUANTITIES (sheet 2)

— A. Proofread Quantities

— 1. Check CATS numbers against descriptions

— 2. Check for 2000 specifications on english jobs

— 3. Check for 1986 specifications on metric jobs

— B. Agrees with Cats

— C. Check Quantity for correct Unit

— D. Inclusion Items Reflected in Totals

— E. Minimum Quantities Per Plan Preparation Guide

— F. Asphalt Materials Used Comply With Guidelines for Hot Mix Asphalt Selection (Latest Version)

— G. Open Graded Friction Course - use 6.5% for liquid asphalt binder (cement)

— H. Check for milled in rumble strips on inside & outside shoulders of all interstate projects excluding ramps.

__ I. Check also for 4 x 4 Yellow Markers

__ J. All District 6 Projects to include

__ 1. 1050800 Construction stakes lines & Grades.

__ 2. 1090200 As-built construction plans.

__ K. Check for Graded Aggregate Base Course not shown with alt. on english jobs.

__ L. Check for New Alternate Bases on metric jobs.

__ 1. Marine Limeston Base Cr.

__ 2. Portland Cement Concrete Base Cr.

__ 3. Macadam Base Cr.

M. Check for Coquina Base in district 5.

__ 1. Note placed on General Construction Note sheet when Coquina Base is selected. (see Instructional Bulletin 2000-2)

N. All Bridge Projects Developed by Road Design will Include Pavement Markings

__ 1. 6011010 Paint 4" White Solid Lines (Pvt. Edge Lines)

__ 2. 6012005 Paint 4" Yellow Broken Lines (Gaps Exc.)

__ 3. 6012010 Paint 4" Yellow Solid Lines (Pvt. Edge & No Passing Zone)

__ 4. 6033005 Permanent Yellow Pavement Markers Bi-Dir., Refl. 4"x4" (See Instructional Bulletin No. 99-4)

IV. MOVING ITEMS and REMOVAL & DISPOSAL ITEMS (sheet 2A)

— A. Not Required per Project Manager
B. Included
— 1. Location
— 2. Description
— 3. Owner
— 4. Work To Be Done
C. Project Identification Box
— 1. County
— 2. File Number
— 3. Road/Route Number
— 4. Sheet Number
— D. Shown on Plans

V. TYPICAL SECTION'S (Sheet 3)

— A. Check Plan Quantities
— 1. Pavement
— a. Base
— b. Binder
— c. Surface
— d. Liquid Asphalt Binder (Check section number and type)
— e. Prime coat (use only on Earth Type Base Course & Graded Aggregate Base Course)
— f. Agrees w/ Plans

V. GENERAL CONSTRUCTION NOTE AND INCLUSIONS (SHEET 5)

— A. Standard Construction Note
— B. Inclusion Items -Items Not Shown in Detail on Plans
— 1. Check items for appropriate unit
— a. Observe minimums per Plan Preparation Guide
— b. Accurate description for intended use
— C. Clearing and Grubbing Outfall Ditches
— D. Drives & Build Up/Leveling
— 1. Base/Binder
— 2. Surface
— 3. Liquid Asphalt Binder
— E. Extra Pipe Per Field Review
— F. Perforated Pipe Underdrain Per Field Review
— 1. Aggregate Underdrain
— a. For 100 mm (4”) pipe=0.28 m^3 per meter (11CY per 100LF)
— b. For 150 mm (6") pipe = 0.33 m^3 per meter (13CY per 100LF)
— H. Riprap (Tons)
__ 1. Geotextile Fabric under Riprap
__ 2. Quantities broken down for specific use (bride ends, ditches, etc.)

V. GENERAL CONSTRUCTION NOTE AND INCLUSIONS (continued)

— I. Reset Fence
— J. Seeding/Sodding
— 1. Unmulched unless otherwise specified on field review
— a. Fertilizer (10-10-10) - Tons (1,121 Kg/Hectare [1000#/Ac])
— b. Lime - Tons (2.24 Ton/Hectare [1 Ton/Acre])
— c. Nitrogen - Kg (53.8 Kg/Hectare) [Pounds (48# Per Acre)]
— 2. Temporary Seeding
— a. 50% unless otherwise specified on Field Review
— b. Fertilizer @560 kg/ha (500 lbs. /Ac) unless otherwise specified on Field Review
— K. Mowing
— L. Erosion Control Items (Listed Separate)
— 1. Baled Straw per Field Review / Job Requirements
— 2. Silt Fence per Field Review / Job Requirements
— 3. Other Items
— a. Specified on Field Review
— b. Necessary for adequate erosion control
— M. Unclassified Excavation & Borrow Per Field Review - removal and replacing unstable material
__ N. Prime Coat for Aggregate or Sand Clay Bases
__ O. “These Plans Developed . . . . .” Scroll Data
__ P. Alternate Pipe Notes
__ Q. Removal of Asphalt
__ R. Recommend checking inclusion note for State Highway Engineer not Deputy Director of Construction.

IX. REFERENCE DATA SHEETS (Sheet 5A, 5B, etc.)

A. Plan Data
— 1. Control Points
— 2. Reference Points
__ 3. Curve Data
— a. Superelevation per Std. 100-6
__ 4. Benchmarks
— a. Description
— b. Elevation
— c. Datum (Assumed, NAVD-88, Or NGVD-29 Per Instructional Bulletin 96-3)
— 5. Curb Grade Profile Data

B. Project Staking Data
— 1. Curves Numbered to Agree with Plans

C. Plan Sheet Layout Diagram
— 1. Agrees with Plans
— 2. Match Lines & Stations
— D. Relocation Control Points Per Instructional Bulletin 97-10

E. Project Identification Box
— 1. County
— 2. File Number
— 3. Road/Route Number

VII. ALL PLAN SHEETS
— A. File Number, County, Road/Route No., and Sheet Number
— B. Begin/End Notes as Needed
— C. Guardrail and Notes (Check as per Roadside Design Guide)
— D. Special Notes (ie. Removal of Asphalt, Construction of Entrance, etc.)
— E. Earthwork (Plan Sheets)
— 1. Connectors
— 2. Entrances
— 3. Outfall Ditches
— F. Drainage - Pipe and Structures
— 1. Check against Field Review Recommendations / Hydrology
— 2. New Pipe (Correct Symbology)
— 3. Divisible by 1.22 meters (4.0')
— 4. Adequate Cross line Lengths
— 5. Location of Catch Basins
— a. Agrees with grades
— b. Locations (Low Points and Spacing)
— 6. Agrees with Summary of Estimated Quantities
— 7. Extra depth of box
— 8. Structures (ie. Culvert)
— a. Agrees with Culvert Details (Bridge Department)
— 9. Drainage Information provided by Hydraulic Section (Including invert elevation for storm sewer and cross line pipe)
— 10. Check Profile for cross line pipe (36" or greater-Hydrology data)
— 11. Length of pipe plotted correctly.
— G. Moving Items and Removal & Disposal Items
— 1. Agrees with sheet 2a

VIII. PROFILE SHEETS
— A. Earthwork
— 1. Notes Agree with Excavation / Embankment on Cross-Sections
— 2. Balance Points
— 3. Overhaul
— a. 1,000 m (3,000 ft) Freehaul - Roadway Only
— b. Include calculations in quantity folder
— 4. Agrees with sheet 2
— 5. Vertical curves - (D.S. for F.H.W.A only)
— B. Toe of fill
— C. Begin and End Notes

— D. Percent of Grade
— 1. Check for minimum or maximum grade
— Ditch Section 0.10%
— Curb and Gutter 0.30%
— Valley Gutter 0.40%
— E. Curb grades included in plans.
— 1. Agree with centerline grades when parallel.
— 2. Agree with top of curb elevations on cross sections.

IX. EROSION CONTROL PLANS
— 1. Need Erosion Control Data sheet if N.P.D.E.S. is over 5.0 Acres

X. CROSS SECTIONS
— A. Volumes agrees with earthwork
— B. Elevations Agree with Profile
— C. Agrees with Typical Sections
— D. Toe of fill
— E. Begin and End Notes

QUALITY CONTROL REVIEW

(CONSTRUCTION / RIGHT OF WAY PLANS)

QUALITY CONTROL / ASSURANCE REVIEW

___ PRELIMINARY ___ FINAL

County: _____ Road/Route: _____ PIN: _____

Design Group No.: _____ - Secondary/Primary (Circle one)

Consultant: _____

Reviewed By: _____ _____ _____ _____
Initials Begin Date End Date Let date

Forwarded to Hydrology Group : _____ On: _____ By: _____

I. CHECK PPMS DATA
— A. Project Identification Number (PIN)
— B. County
— C. File Number
— D. Project Number
— E. Road/Route Number(s)

II. COVER
— A. Project Identification Number (PIN)
— B. County and County Number Agree
— C. File Number
— D. Project Number
— E. Road/Route Number(s)
— F. From/To Description
— G. Group Coordinator-Road Design Initials
— H. Special Provisions Notes

III. TITLE SHEET (Sheet 1)
— A. Correct Reference Title Sheet for Project
— B. Index with Subtotals and Total Sheets
C. Location / Description
— 1. Check Map against Description.
— 2. North Arrow
— 3. Location Map Labels (.....County or Town/City of.....)
— a. Fill out Town/City approved by box (cross out if not in Town/City)
— D. NPDES Data
— E. Longitude and Latitude
— F. Railroad Involvement Indicated
— G. Traffic Data
H. Check Beginning and Ending Stations Notes on Location Map Agree with:
— a. Typical Sections
— b. Plans
— c. Profiles
— d. Cross Sections
— e. Include arrows indicating “Begin” and “End” of project survey(s)
— f. Project area clearly highlighted on map.

2. Include notes for bridges/culverts and notes for exceptions Agree with :
— a. Typical Sections
— b. Plans
— c. Profiles
— d. Cross Sections

I. Check Length of Project
— 1. Show Length(s) in Thousandths (Three Decimal Places)
— 2. Show mileage for each mainline survey(sideroads, connectors. ramps, etc.).
— 3. Show total mileage if multiple roads/lines.
— 4. Check for Exceptions for Roadway.
— 5. Show equalities in stationing:
— a. Agrees with Plans
— b. None
6. Check for Bridge/Structures Over 6.1 m (20') In Length.
— a. Included in plans
— b. Note: "Bridge plans bound under separate cover".

— J. Group Coordinator - Initials and Date
— K. Project Facilitator - Initials and Date
— L. Standard Drawing & Specification Note - Date 1986 (Or Latest Edition)
— M. Design Group No. / Group Coordinator Initials & Initials of Preparer
— N. Check for correct Seal on Title sheet
__ 1. "Signature only" Required by Eargle for "C" Projects Sealed by Williamson
__ 2. In addition to Eargle's Seal check Program Development map legend for correct Seal (Rocque Kneece or John Walsh)on STP, BRT, Etc. Projects.

O. Project Identification Box
— 1. Project Identification Number (PIN)
— 2. County
— 3. File Number
— 4. Project Number
— 5. Road/Route Number
— 6. Total Sheets

IV. SUMMARY OF ESTIMATED QUANTITIES (sheet 2)
— A. Proofread Quantities
— 1. Check CATS numbers against descriptions.
— 2. Check for 2000 specifications on english jobs
— 3. Check for 1986 specifications on metric jobs
— B. Agrees with Cats
— C. Check Quantity for correct Unit.
— D. Inclusion Items Reflected in Totals
— E. Minimum Quantities Per Plan Preparation Guide
— F. Asphalt Materials Used Comply With Guidelines for Hot Mix Asphalt Selection (Latest Version).
— G. Open Graded Friction Course - use 6.5% for liquid asphalt binder (cement)
— H. Check for milled in rumble strips on inside & outside shoulders of all Interstate projects excluding ramps.
__ I. Check also for double 4 x 4 Yellow markers.

J. All District 6 Projects to include
__ 1. 1050800 Construction stakes lines & Grades
__ 2. 1090200 As-Built Construction Plans

__ K. Check for Graded Aggregate Base Course not shown with alt. on english jobs.
__ L. Check for New Alternate Bases on metric jobs.
__ 1. Marine Limestone Base Cr.
__ 2. Portland Cement Concrete Base Cr.
__ 3. Macadam Base Cr.

M. Check for Coquina Base in district 5.

__ 1. Note placed on General Construction Note sheet when Coquina Base is selected. (see Instructional Bulletin 2000-2)

N. All Bridge Projects Developed by Road Design will Include Pavement Markings

__ 1. 6011010 Paint 4" White Solid Lines (Pvt. Edge Lines)
__ 2. 6012005 Paint 4" Yellow Broken Lines (Gaps Exc.)
__ 3. 6012010 Paint 4" Yellow Solid Lines (Pvt. Edge & No Passing Zone)
__ 4. 6033005 Permanent Yellow Pavement Markers Bi-Dir., Refl. 4"x4" (See Instructional Bulletin No. 99-4)

V. MOVING ITEMS and REMOVAL & DISPOSAL ITEMS (sheet 2A)

— A. Not Required per Project Manager

B. Included

— 1. Location
— 2. Description
— 3. Owner
— 4. Work To Be Done

C. Project Identification Box

— 1. County
— 2. File Number
— 3. Road/Route Number
— 4. Sheet Number

— D. Shown on Plans

VI. TYPICAL SECTION (S) (Sheet 3)

A. Check against Pavement Design and/or Design Plans Field Review Recommendations.

— 1. Widths and Thickness/Rates of Materials
__ a. Agrees with plans and x-sections
— 2. Pavement Legend
— 3. Asphalt Materials Used Comply With Guidelines for Hot Mix Asphalt Selection (Latest Version).
— 4. Alternate Aggregate Bases Shown (if required for metric) - not to be used in areas with 6' or less width (Requires note on typical section).

— B. “NTS” If Not To Scale

— 1. Vertical Dimensions
— 2. Horizontal dimensions
— a. Agrees with plans

C. Drawn to Scale

— 1. Vertical Dimensions
— 2. Horizontal dimensions
— a. Agrees with plans
— 3. Slopes

D. For “variable” Widths Show:

— 1. Variation (example: Variable 1.5 to 7.0)
— 2. Dimension Shown on Typical Section (example: Shown 5.5)

E. For “variable” Slopes, Show:

— 1. Variation (6:1 to 2:1)
— 2. Slope Shown on Typical Section (shown 4:1).
— 3. Fill Height at each Slope Change

— F. Inclusive of Beginning/Ending Stations of Project

— 1. Notes To Cover Areas Not Represented In Typical Stations.

— G. Point of Grade Indicated

H. Design Speed Block
— 1. Completed
— 2. Exceptions Noted (Horizontal)
— 3. Lowest Speed Noted For Group 1 Roads (No Exceptions To Be Noted)
— I. Ditch note allowing variable ditch where applicable
J. Check Pavement / Base Quantities
— 1. Check that quantities agree with plans (sheet 2)
K. Other Notes/Details
— 1. Re: Applicable Standard Drawings
— 2. Re: Guardrail (Extra 3.5')
— 3. Re: Curb & Gutter/Sidewalk
— 4. Necessary Detail Drawings
L. Lane Width
— a. Agrees with Plans
— M. Minimum 1.0 Depth of Ditch
N. Project Identification Box
— 1. County
— 2. File Number
— 3. Road/Route Number
— 4. Sheet Number

VII. RIGHT OF WAY DATA SHEET (Sheet 4)
A. Tract Numbers
— 1. Agree with Property Strip Map
— 2. Agree with Plans
B. Owner(s)
— 1. Agree with Property Strip Map
— 2. Agree with Plans
— C. Tax Map Reference
D. Tract Total
— 1. Hectares and (Acres) or square meters and (square feet) per Right of Way Instrument
— D. Obtain in square meters and (square feet) and hectares and (acres)
— E. Remain in Hectares and (Acres)
— 1. If equal to or less than 0.1 Hectare (0.25 acres) show remain in square meters (square feet)
— F. Date Acquired
G. Permissions Noted
— 1. Outfall Ditches
— 2. Slope
— 3. Drainage Structures
— 4. Erosion Control
— 5. Entrance
H. Project Identification Box
— 1. County
— 2. File Number
— 3. Road/Route Number
— 4. Sheet Number

VIII. PROPERTY STRIP MAP (Sheet 4A)

— A. Tracts Numbered
— B. Owner
— C. Clearly Note Present and New Right of Way
— 1. Agrees with Plans
D. Project Identification Box
— 1. County
— 2. File Number
— 3. Road/Route Number
— 4. Sheet Number

IX. GENERAL CONSTRUCTION NOTE (Sheet 5)

— A. Omitted for R/W Plans
— B. Standard Construction Note
— C. Inclusion Items -Items Not Shown in Detail on Plans
— 1. Check items for appropriate unit
— a. Accurate description for intended use.
— D. Clearing and Grubbing Outfall Ditches
— E. Drives & Build Up/Leveling
— 1. Base/Binder
— 2. Surface
— 3. Liquid Asphalt Binder
— F. Extra Pipe Per Field Review
— G. Perforated Pipe Underdrain Per Field Review
— 1. Aggregate Underdrain
— a. For 100 mm (4") pipe = 0.28 m^3 per meter (11CY per 100LF)
— b. For 150 mm (6") pipe = 0.33 m^3 per meter (13CY per 100LF)
— H. Riprap (Tons)
__ 1. Geotextile Fabric under Riprap
__ 2. Quantities broken down for specific use (bride ends, ditches, etc.)
— I. Reset Fence
— J. Seeding/Sodding
— 1. Unmulched unless otherwise specified on field review
— a. Fertilizer (10-10-10) - Tons (1,121 Kg/Hectare [1000#/Ac])
— b. Lime - Tons (2.24 Ton/Hectare [1 Ton/Acre])
— c. Nitrogen - Kg (53.8 Kg/Hectare) [Pounds (48# Per Acre)]
— 2. Temporary Seeding
— a. 50% unless otherwise specified on field review
— b. Fertilizer @560 kg/ha (500 lbs. /Ac) unless otherwise specified on field review
— K. Mowing
— L. Erosion Control Items (Listed Separate)
— 1. Baled Straw per field review / Job Requirements
— 2. Silt Fence per field review / Job Requirements
— 3. Other Items
— a. Specified on field review
— b. Necessary for adequate erosion control
— M. Unclassified Excavation & Borrow Per field review - for removal and replacing unstable material.
__ N. Prime Coat for Aggregate or Sand Clay Bases (Per Instructional Bulletin 94-7).
__ O. “These Plans Developed . . . . .” Scroll Data (Per Instructional Bulletin 94-8).
__ P. Alternate Pipe Note (Per Instructional Bulletin 96-8).
__ Q. Note for Removal of Asphalt (Per Instructional Bulletin 97-2).

R. Project Identification Box
— 1. County
— 2. File Number
— 3. Road/Route Number
— 4. Sheet Number

X. REFERENCE DATA SHEETS (Sheet 5A, 5B, etc.)
A. Plan Data
— 1. Control Points
— 2. Relocation Control Points(Per Instructional Bulletin 97-10)
— 3. Reference Points
4. Curve Data
— a. Superelevation Noted (Per Standard Drawing No. 100-6)
— 5. Benchmarks
— a. Description
— b. Elevation
— c. Datum (Assumed, NAVD-88, Or NGVD-29 Per Instructional Bulletin 96-3)
— 5. Curb Grade Profile Data
B. Plan Sheet Layout Diagram
— 1. Agrees with Plans
C. Project Identification Box
— 1. County
— 2. File Number
— 3. Road/Route Number
— 4. Sheet Number

XI. FIRST PLAN SHEET
A. Right of Way Note(s) for Present R/W
— 1. File/Docket/Project Number / Date
— B. Utility Notes
— C. All Items in Section XII Below?

XII. ALL PLAN SHEETS
— A. North Arrow
— 1. Bearing(s) on all Centerline Tangents
— B. Begin/End Notes
C. R/W Data
— 1. Show Property Lines
— 2. Tracts numbered
— 3. Property owners
— 4. Give Pluses for Shifts and at Beginning and End of Tapers for New R/W.
— 5. Label R/W at Beginning and End of each Plan Sheet.
— 6. Label R/W at Breaks/Shifts for New R/W.
— 7. Label sight Areas (see Plan Preparation Guide page 12-7)
— 8. Label Moving Items.
— 9. Label Removal and Disposal Items.
— 10. Label "Obtain permission":
— a. Ditches Beyond Right of Way Limits.
— b. Drainage Beyond Right of Way Limits.
— 11. Estimated Excavation
— a. Entrances
— 1. Beyond Right of Way Limits
— 2. Relocated (New Construction/Alignment)
— 3. Estimated Excavation
— b. Pipe/Drainage Structures Beyond Right of Way Limits

D. Show Travelway Widths
— 1. Beginning & End of Each Sheet
— 2. Beginning and End of Tapers
— a. Give Pluses at Beginning and End.
— 3. Radii at Intersections per Face of Gutter/Edge of Pavement.
— 4. Medians Labeled per Standard Drawing No. 100-8
— E. Construction Lines Plotted and labeled (cut/fill)
— 1. N.P.D.E.S. lines (Per Instructional Bulletin 96-2).
— F. New Guardrail Plotted (Check Roadside Design Guide) - use only after all other options are considered.
— G. Relocation Notes (Per Instructional Bulletin 97-10)
— H. Plotted For Readability at 50% reduction
— I. Label Control of Access
— J. Special Notes
K. Drainage - Pipe and Structures
— 1. Check against Design Plans Field Review Recommendations / Hydrology.
— 2. Divisible by 1.22 meters (4.0')
— 3. Adequate Cross line Lengths
— 4. Location of Catch Basins
— a. Agrees with grades
— b. Locations (Low Points and Spacing)
— 5. Agrees with Summary of Estimated Quantities.
— 6. Extra depth of box
— 7. Structures (ie. Culvert)
— a. Agrees with Culvert Details (Bridge Department).
— 8. Drainage Information provided by Hydraulic Section (Including invert elevation for storm sewer and cross line pipe).
— 9. Check Profile for cross line pipe 36" or greater (Hydrology data)
— 10. Length of pipe plotted correctly.
— L. Symbology (Per Standard Drawing No. 100-8)
M. Design
— 1. Travelway Widths and Lane Widths
— 2.Turning Radii (meets design)
— 3. Sight Distances (Stopping)
— 4. Lane Alignment
— 5. Design Speed
N. Project Identification Box
— 1. County
— 2. File Number
— 3. Road/Route Number
— 4. Sheet Number

XIII. PROFILE SHEETS
A. Grade Line
— 1. Percent of Grade
— a. Check for minimum grade
ditch section 0.10
curb and gutter 0.30
valley gutter 0.40
— 2. Vertical Curves
— a. PI Station and elevation
— b. Lengths
— c. Design speed(s) for federal aid projects
— d. Sight Distance

— 3. Exceptions Noted
— 4. Equalities in stationing plotted
— B. Begin and End Notes
— C. Special Ditch Notes
— D. Proposed Outfall Ditch Grades
— E. Elevations
— 1. P.C. s
— 2. P.T. s
— 3. Percent of Grade Shown.
— 4. Type of Gradeline Noted (Finished, Subgrade, Spline).
— 5. Agrees with X-Sections
— F. Vertical Design (Sight Distances)
— G. Vertical Clearances (Bridges, Overpasses, Trees etc.)
— a. Structure Stations
— b. Toe of fill
— H. Vertical curves - (D.S. for F.H.W.A only)
— I. All information shown can be readable at 50% reduction
— J. Earthwork
— 1. Notes Agree with Excavation / Embankment on Cross-Sections.
— 2. Balance Points
— 3. Overhaul
— a. 1,000 m (3,000 ft) Freehaul - Roadway Only
— b. Include calculations in quantity folder.
— 4. Agrees with sheet 2
— K. Curb grades included in plans.
— 1. Agree with centerline grades when parallel.
— 2. Agree with top of curb elevations on cross sections.
— L. Project Identification Box
— 1. County
— 2. File Number
— 3. Road/Route Number
— 4. Sheet Number

XIV. CROSS SECTIONS

NOTE: If Cross Sections Are Bound Separately, Check Cross Section Cover per Section II of Checklist. (include a copy of Title sheet)

— A. Begin/End Notes
— B Exception Notes
— C Equality in Stationing Notes
— D. Agrees with Typical Section
— E. Volumes agrees with earthwork
— F. Elevations Agree with Profile
G. S. E. Notes
— 1. Beginning and Ending
— 2. Maximum
— 3. Not required for Curb and Gutter Sections.
H. Bridge Notes
— 1. Begin and End of Bridge
— 2. Toe of Fills
I. Project Identification Box
— 1. County
— 2. File Number
— 3. Road/Route Number
— 4. Sheet Number
— 5. Sheet Number (X1- __)

May 22, 2000

ROAD DESIGN REFERENCE MATERIAL

FOR CONSULTANT PREPARED PLANS

AERIAL PHOTOGRAPHY, CONTROL SURVEYS, AND MAPPING

Control surveys to allow the production of 1" = 50-foot mapping at one-foot contour interval will be performed. Necessary surveys will be conducted to identify control points and GPS points to provide sufficient coverage of the final alignment. Coordinates and elevations will be established for these critical control points. Composition and placement of legal advertisement for notice to affected landowners prior to field surveys will be provided by the Department, as required by law.

Base mapping, at a scale of 1" = 50' and one-foot contour interval, will be digitized in three dimensional (3D) Intergraph format. The width of the topography and planimetrics will cover the width of the proposed right-of-way. The mapping will be provided on electronic media in Intergraph format and bond (22" x 36" 'D'-size) prints. No reverse-side prints are acceptable.

ENGINEERING SURVEYS

A. Engineering surveys will be performed on the final alignments to determine accurate elevations and locations of existing facilities such as roadways, bridges, culverts, utilities, railroads, and drainage facilities as needed for design. The items to be incorporated in the engineering surveys will be in accordance with the approved Department design survey assumptions and the Department's Survey Manual.

B. All points shot on the survey will be shown in the original topography.

PRELIMINARY ROADWAY PLAN PREPARATION

The purpose of this task is to perform roadway design efforts to the point necessary for development of final right-of-way plans. In this regard, efforts will focus on the identification of construction limits and property requirements. Preliminary design relating to the following activities will be developed:

A. Plan and profile sheets for highways, interchanges, streets, and roads showing information necessary to permit construction stakeout and to indicate and delineate details necessary for construction. Profile shall be shown in the plans at a scale of 1" = 10' vertically and 1" = 50' or 20’ horizontally to match scale of plans.

B. Design and earthwork shall be accomplished on a CADD system using the software MicroStation. It is strongly recommended that the design software be GEOPAK.

C. Detailed plan sheets for all design features requiring additional detailed design information, including but not limited to the items below:

1. The geometry of intersections
2. Local street treatment
3. Drainage facilities
4. Appurtenances
5. Geotechnical subsurface investigations
6. Geometric control (vertical and horizontal)
7. Construction limits (lines)
8. Right-of-Way (present and proposed)
9. Ties and equalities
10. Property lines
11. Property ownership
12. Property parcel number
13. Control of access, and

14. Others as per Department Standards.

D. Design standards will be in compliance with AASHTO's A Policy of Geometric Design of Highways and Streets (1990) or latest edition; SCDOT's Standard Specifications for Highway Construction (1986); AASHTO's Standard Specifications for Highway Bridges (1989); SCDOT's Highway Design Manual, SCDOT's Standard Drawings for Road Construction and SCDOT's Access and Roadside Management Standards and Engineering Directive Memorandum PC-27 "Quality Control/Quality Assurance of Road Plans". Road and Bridge Plan Preparation Standards and CADD Standards utilized by the Department should be used, whenever possible.

E. Designs should meet desirable standards, whenever possible, unless the minimum criteria is specifically approved by the Department in writing.

F. Cross-sections of highways, interchanges, intersections, roads, streets, and ramps showing the existing and proposed typical sections, at intervals of 100 feet on tangents and 50 feet on horizontal curves, measured along the centerline or baseline of construction. In areas of ramps and interchanges, cross-sections are to be perpendicular to the referenced centerline.

   Templates are to be placed on original cross-section by CADD. Cross-section scale shall be 1" = 5' both vertical and horizontal, unless another scale is authorized by the Department. In the areas of ramp and mainlines, templates are to be perpendicular to the referenced centerline.

G. Additional cross-sections, as necessary, to complete construction of the project.

Upon completion of the preliminary plans, one set of bond (22" x 36" 'D'-size) prints will be submitted to the Department for review. After initial review, the Department will return one set of plans marked with desired changes. After revision, one set of bond (22" x 36" 'D'-size) prints of the revised preliminary plans will be provided. No reverse-side prints are acceptable.

RIGHT-OF-WAY PLANS

A. Final right-of-way plans will be developed to depict the following:

1. All projects, except secondary ('C') projects, non-surveyed projects, and bridge projects, shall have all affected properties numbered and closed. Greenville County is the exception to this rule. Secondary ('C') projects in Greenville County shall also be closed.

2. Property ownership

3. Property improvements

4. Access control

5. Existing and proposed right-of-way

6. Existing known utilities

7. Construction limits

8. Show all easements, or right of way, needed for road construction and for implementation of the Sedimentation and Erosion Control Plan.

9. Design speed on the first Typical Section Sheet.

10. Rate of Superelevation, design speed, control points, state plane coordinates and bench marks located on Reference Sheets.

11. Location of all topographic features including utilities by stations and offsets.

12. Include stations and offsets for right of way changes (i.e. step out /in and beginning and end of tapers).

13. Appropriate labeling of triangular areas to be obtained as well as present triangular areas.

14. Verification of present right of way (File and date obtained).

15. Identify any pipe, drainage structures, etc., outside R/W with "Obtain Permission".

16. Label all ditches with "Obtain permission" for cleaning, constructing and include estimated length and excavation.

17. Include Right of Way Summary Sheet with all information provided.

18. Designate obtains as marsh lands/highlands if pertinent to job.

19. Dimension lines for critical R/W areas such as nonparallel survey/construction centerlines and complicated intersections etc. where more clarification would be necessary.

20. Adequate horizontal and vertical control data to facilitate ease of construction for department personnel - Reference points for all PC's, PI's, PT's, and POT's.

21. Include PIN (Project Identification Number) on cover and title sheet.

22. Fences which are not "standard" as shown in drawings 806-1, 806-2, and 806-3 to be shown as moving items and not reset fence if relocation is necessary.

23. Detailed description of moving items if included in notes. Also include Moving Item Sheet and show on plans.

24. Completion of Hydrology that affects Right-of-Way.

25. Plan sheets shall have Tract No. and Owner's name; also, drainage and relocated driveway permission must be shown.

26. Property layouts need only Tract Numbers.

27. Right of Way obtains and remainders shall be shown in acres or square feet.

    Total obtains less than 0.25 acre will be shown in square feet.

28. All Right of Way revisions shall be noted in the revision block or in the upper right hand corner of the sheet if no revision block is available.

B. All parcels of property to be acquired as right-of-way will be assigned a parcel number, identification of property owner, areas of property obtained and remaining, and acreage of permanent easements indicated. The entire parcel of property from which right-of-way is to be acquired will be shown (even if illustrated as an insert at a reduced scale).

C. All field inspection and public hearing recommendations accepted for inclusion in the plans are to be verified and made part of the right-of-way plans. Right-of-way plans will be provided to the Department Program Manager on bond (22" x 36" 'D'-size) prints (1" = 50') and on electronic media in MicroStation format. It is recommended that GEOPAK software be used for design, etc. No reverse-side prints are acceptable.

D. Electronic media receivables for right of way plans will be provided to the Road Design Consultant Services Facilitator on CD-ROM and will include the following items:

1. Preliminary index of all files provided with detailed descriptions of their content or purpose.

2. All MicroStation CADD files that pertain to existing property lines, owners, layouts their improvements and labeling.

3. All MicroStation CADD files that pertain to existing and proposed Right of Way lines, obtains and remains and it’s labeling as well as Right of Way Data sheets.

4. All MicroStation CADD files that pertain to existing and proposed pipes, drainage structures, Bridges and other hydraulic features as well as the labeling of these items.

5. All MicroStation CADD files that pertain to Utilities or Rail Roads.

6. All MicroStation CADD files that contain Typical Sections for projects.

7. All MicroStation and Raster CADD files that pertain to project Title Sheets.

8. All MicroStation CADD files that show construction limits of project.

9. All MicroStation CADD files that pertain to Moving Items.

10. Any other MicroStation CADD files that would supplement the ability to view files correctly such as reference files and cell libraries.

11. If GEOPAK Civil Design Software was used for developing plans, then all .gpk files and any other GEOPAK files, such as input and criteria files that are needed to facilitate the checking of Right of Way plans should be submitted.

12. If other Civil Engineering software package was used for project development then all binary or ASCII files that are software dependant for that package should be submitted.

13. Copies of any manual or electronic calculations or notes (non-CADD) that will facilitate the checking of Right of Way plans.

14. All hard copies of the plans submitted should have the name of the electronic file printed on the sheet.

15. Provide plotting instructions in order to reproduce all sheets including levels plot boundary and pen tables.

E. During the course of completing the final plans for construction, should changes be necessary which will affect right-of-way, these revisions will be promptly made, documented as revisions on plans, and identified to those implementing right-of-way appraisal and acquisition.

ROADWAY CONSTRUCTION PLANS

A. Construction plans will be a continuation of right of way plans and a separate set is not acceptable. Original right of way plans will be retained by the Consultant after appropriate Department reviews and signatures and then developed into construction plans.

B. Plan and profile sheets for mainline roadways and intersection streets showing information necessary to permit construction stakeout and to indicate and delineate details necessary for construction.

C. Title Sheet for construction plans with title sheet for right of way to follow as sheet 1A (for information only).

D. Detailed plan sheets for all design features requiring additional detail design information, including but not limited to:

- The geometry of intersections
- Local street treatment
- Drainage facilities
- Appurtenances
- Details covering special problems
- Geometric control (vertical and horizontal)
- Construction limits (lines)
- Right-of-way (existing and proposed)
- Ties and equalities
- Other as per Department standards
- Utilities
- Sedimentation and Erosion Control Plan
- Traffic Control Plan
- Pavement Marking Plan
- Moving Items
- Signing plans

E. Drainage designs in accordance with the approved hydrological/hydraulic criteria. A complete tabulation of the drainage analysis along with the calculations used to determine the size of drainage structures will be submitted.

F. Additional cross-sections as necessary to complete construction of the project.

G. At locations where existing traffic is to be maintained, a detailed construction staging plan, showing details of all detour ratings, temporary pavements, and special traffic control devices will be provided. Required restrictions to construction sequence will also be included.

H. Construction Plans will be provided to the Department on bond (22" x 36" 'D'-size) prints (1" = 50') and on electronic media in MicroStation format. It is recommended that roadway design be provided with the use of GEOPAK software. No reverse-side prints are acceptable.

I. Benchmarks shall be provided at a minimum of every 1,000 LF of mainline or sideline length - Benchmark descriptions shall be placed on Reference Sheets.

J. Cross-sections plotted on a scale of 1" = 5' vertical and horizontal, unless another scale is authorized by the Department.

K. Construction plans shall also include the following:

1. Show riprap on plan sheets (in Tons) for areas requiring riprap.

2. Use of Type 16, 17, & 18 catch basins in areas of curb and gutter.

3. Show linear feet of guardrail and type anchor(s) to be used at each installation location on plans.

4. When needed to maintain traffic, use "Maintenance Stone" in lieu of Aggr. CR-14.

5. Traffic data including schematics of major intersections showing traffic flow should be shown on the Title Sheet.

6. Include Permanent Construction Signs and Mobilization on ALL roads.

7. If full depth patching is used be sure to include Maintenance Stone for this purpose.

8. Show all erosion control quantities in general construction note as inclusion items, unless detailed on plan sheets.

9. Include traffic control, pavement marking, and permanent signing in plans, if applicable.

10. Verify item numbers and units for quantities near end of completion of plans in case of recent changes and/or additions.

11. Constructability of project to meet present Department policies, standards and specifications.

12. Typical section stations should be inclusive of stations on job, ending and beginning at common stations or project exceptions and bridges.

13. Include all station equalities on title sheet under mileage box, plan and profile sheets, cross-sections and typical sections.

14. Include those items listed under the "Right-of-Way Plans" as required for construction.

15. All bid items shall have an item number on the Department's CATS System.

16. Final description of moving items.

17. Bridges, exceptions, and bridge length box culverts (>20') should be flagged or shown in a box on the Title Sheet.

18. Special drawings for items not covered by standard drawings.

SPECIFICATIONS AND BID PROPOSAL

Consultant will prepare detailed specifications and special provisions covering items of construction not covered by the State's standard specifications or standard bridge special provisions. In addition, consultant will prepare a bid proposal as required by the Department. All bid items shall have an item number on the Department's CATS system.

CONSTRUCTION PHASE RECEIVABLES

One set of the bid proposal, specifications, special provisions and one set of bond (22" x 36" 'D'-size) prints of the final construction plans will be submitted to the Department for review. No reverse-side prints are acceptable.

Upon receipt of the final construction documents by the Department, one copy of the completed, checked and signed bond (22" x 36" 'D'-size) prints of the final construction plans will be provided to the Department along with one copy of all quantity and design calculations, and final CADD and computer outputs.

The full size construction plans will be delivered to either the Department's Program Manager or Construction and Resource Manager, whichever is applicable, who will then forward them to the Road Design Operation's Manager. After a review of the plans for letting, the plans will be taken to Engineering Reproduction Services for printing and distribution to prospective Bidders. Any revisions made prior to the Long Ad shall be made by (A) the Consultant mailing a complete set of plans with revisions and up to date signatures to the same person mentioned above or (B) the Consultant inserting the revised sheet or sheets into the plans at the Department. After the revisions are made the old plans or old plan sheets will be discarded. Any revised plan sheets after the project has been made available to the Bidders will be delivered to the Department in the same way discussed above, but the revised sheets will not be inserted into the plans. The revised sheets with an addendum letter to the Bidder will be distributed with the original plans. For example if there are three addenda to the plans, then the original plans will be distributed to the Bidder with three addendum letters and the revised sheets. After the Letting, the plans will be corrected using the revised sheets. These revised plans will be marked by the Engineering Reproduction Manager on the Title Sheet, "DUPLICATE CONFORMED COPY" denoting that these plans have been revised and are now complete.

The Consultant will mark "Original Conformed Copy" on the top right quadrant of the Title Sheet of the original plans, which will include all revisions, made available to the Bidders prior to the Letting date.

After the Letting the Consultant will retain the Original Conformed Copy of the plans until construction is complete. At which time, the consultant will then deliver the plans to the Road Design Operation's Manager for permanent storage. The "Original Conformed Copy" of the plans will not be revised after the highway Letting. Any revisions made during construction will be included only in the "As-built" set of plans.

The complete bid Proposal shall be provided to the Department by electronic media in Adobe Acrobat (. pdf) format for reproduction. The electronic files for the bid Proposal will be provided by E-mail or CD-ROM to the Engineering Reproduction Manager or Construction and Resource Manager (CRM) who will deliver them to the Engineering Reproduction Manager in accordance with the letting schedule (no later than one week prior to "Plans and Proposal available to Contractors"). Changes to the Proposal after the Proposal has been made available to the Bidders will be sent by the Consultant to the Program Manager or the CRM, whichever is applicable, then the revised pages will be sent to the Contract Administration Office along with an addendum letter to the Bidder describing the change. The Contract Administration Office will distribute the revised sheets of the Proposal with the addendum letter to the Bidders along with the original Proposal (unchanged).

Electronic media receivables for roadway construction plans will be provided to the Road Design Consultant Services Facilitator on CD-ROM.

1. All files that were previously submitted for Right of Way phase with corrections and changes per SCDOT review and in their final form.

2. All surveyed mapping, 2D or 3D contours, spot points, manual surveys, ortho photos and any other CADD files or data used in developing surveys for the project.

3. All MicroStation CADD files that pertain to the project plan and profiles sheets which contain all horizontal and vertical alignments.

4. All MicroStation CADD files that contain any special drawings for the project.

5. All MicroStation CADD files that pertain to Sedimentation and Erosion Control plans.

6. All MicroStation CADD files that pertain to traffic control, pavement markings, detours and special traffic control devices.

7. All MicroStation CADD files that pertain to cross-sections for all project alignment.

8. All MicroStation CADD files that pertain to hydrological/hydraulic data and summary of drainage.

9. If GEOPAK Civil Engineering software was used for project development, then all gpk, ddb, inputs, criteria and tin files used for job should be submitted.

10. If other Civil Engineering software package was used for project development then all binary or ASCII files that are software dependant for that package should be submitted.

11. All electronic files that pertain to the construction stake out. Files should be in SMI format and should include all horizontal controls, vertical controls and templates.

May 23, 2000

ROAD DESIGN REFERENCE MATERIAL

FOR CONSULTANT PREPARED PLANS

IN METRIC

AERIAL PHOTOGRAPHY, CONTROL SURVEYS, AND MAPPING

Control surveys to allow the production of 1:500 mapping at 0.3 m contour intervals in flat terrain, 1.0 m intervals in rolling terrain and 1.5 m intervals in mountainous terrain will be performed. Necessary surveys will be conducted to identify control points and GPS points to provide sufficient coverage of the final alignment. Coordinates and elevations will be established for these critical control points. Composition and placement of legal advertisement for notice to affected landowners prior to field surveys will be provided by the Department, as required by law.

Base mapping, at a scale of 1:500 and contour intervals as shown above, will be digitized in three dimensional (3D) Intergraph format. The width of the topography and planimetrics will cover the width of the proposed right-of-way. The mapping will be provided on electronic media in Intergraph format and bond (914 mm x 559 mm) prints. No reverse-side prints are acceptable.

ENGINEERING SURVEYS

A. Engineering surveys will be performed on the final alignments to determine accurate elevations and locations of existing facilities such as roadways, bridges, culverts, utilities, railroads, and drainage facilities as needed for design. The items to be incorporated in the engineering surveys will be in accordance with the approved Department design survey assumptions and the Department's Survey Manual.

B. All points shot on the survey will be shown in the original topography.

PRELIMINARY ROADWAY PLAN PREPARATION

The purpose of this task is to perform roadway design efforts to the point necessary for development of final right-of-way plans. In this regard, efforts will focus on the identification of construction limits and property requirements. Preliminary design relating to the following activities will be developed:

A. Plan and profile sheets for highways, interchanges, streets, and roads showing information necessary to permit construction stakeout and to indicate and delineate details necessary for construction. Plans scales shall be 1:500 or 1:250 as designated by the Department. Horizontal profile scale shall be the same as plan scale with vertical profile scale of 1:100 or 1:60 to match scale of plans.

B. Design and earthwork shall be accomplished on a CADD system using the software MicroStation. It is strongly recommended that the design software be GEOPAK.

C. Detailed plan sheets for all design features requiring additional detailed design information, including but not limited to the items below:

1. The geometry of intersections
2. Local street treatment
3. Drainage facilities
4. Appurtenances
5. Geotechnical subsurface investigations
6. Geometric control (vertical and horizontal)
7. Construction limits (lines)
8. Right-of-Way (present and proposed)
9. Ties and equalities
10. Property lines
11. Property ownership
12. Property parcel number
13. Control of access, and

14. Others as per Department Standards.

D. Design standards will be in compliance with AASHTO's A Policy of Geometric Design of Highways and Streets (1994) or latest edition; SCDOT's Standard Specifications for Highway Construction (1986); AASHTO's Standard Specifications for Highway Bridges (1989); SCDOT's Highway Design Manual, SCDOT's Standard Drawings for Road Construction, and SCDOT's Access and Roadside Management Standards, SCDOT's Engineering Directive Memorandum PC-27 "Quality Control/Quality Assurance of Road Plans, and Road and Bridge Plan Preparation Standards and CADD Standards used by the Department, whenever possible.

E. Designs should meet desirable standards, whenever possible, unless the minimum criteria is specifically approved by the Department in writing.

F. Cross-sections of highways, interchanges, intersections, roads, streets, and ramps showing the existing and proposed typical sections, at intervals of 20 m on tangents, measured along the centerline or baseline of construction. Additional cross sections may be necessary in special design situations and at major drainage structures. In areas of ramps and interchanges, cross-sections are to be perpendicular to the referenced centerline.

   Templates are to be placed on original cross-section by CADD. Cross-section scale shall be 1:50 both vertical and horizontal, unless another scale is authorized by the Department. In the areas of ramp and mainlines, templates are to be perpendicular to the referenced centerline.

G. Additional cross-sections, as necessary, to complete construction of the project.

Upon completion of the preliminary plans, one set of bond (914 mm x 559 mm) prints will be submitted to the Department for review. After initial review, the Department will return one set of plans marked with desired changes. After revision, one set of bond (914 mm x 559 mm) prints of the revised preliminary plans will be provided. No reverse-side prints are acceptable.

RIGHT-OF-WAY PLANS

A. Final right-of-way plans will be developed to depict the following:

1. All projects, except secondary (‘C’) projects, non-surveyed projects, and bridge projects, shall have all affected properties numbered and closed. Greenville County is the exception to this rule. Secondary (‘C’) projects in Greenville County shall also be closed.

2. Property ownership

3. Property improvements

4. Access control

5. Existing and proposed right-of-way

6. Existing known utilities

7. Construction limits

8. Show all easements, or right of way, needed for road construction and for implementation of the Sedimentation and Erosion Control Plan.

9. Design speed on the first Typical Section Sheet.

10. Rate of Superelevation, design speed, control points, state plan coordinates and bench marks located on Reference Sheets.

11. Location of all topographic features including utilities by stations and offsets.

12. Include stations and offsets for right of way changes (i.e. step out /in and beginning and end of tapers).

13. Appropriate labeling of triangular areas to be obtained as well as present triangular areas.

14. Verification of present right of way (File and date obtained).

15. Identify any pipe, drainage structures, etc., outside R/W with "Obtain Permission".

16. Label all ditches with "Obtain permission" for cleaning, constructing and include estimated length and excavation.

17. Include Right of Way Summary Sheet with all information provided.

18. Designate obtains as marsh lands/highlands if pertinent to job.

19. Dimension lines for critical R/W areas such as nonparallel survey/construction centerlines and complicated intersections etc. where more clarification would be necessary.

20. Adequate horizontal and vertical control data to facilitate ease of construction for department personnel - Reference points for all PC's, PI's, PT's, and POT's.

21. Include PIN (Project Identification Number) on cover and title sheet.

22. Fences which are not "standard" as shown in drawings 806-1, 806-2 and 806-3 to be shown as moving items and not reset fence if relocation is necessary.

23. Detailed description of moving items if included in notes. Also, include Moving Item Sheet and show on plans.

24. Completion of Hydrology that affects Right-of-Way.

25. Plan sheets shall have Tract No. and Owner's name; also, drainage and relocated driveway permission must be shown.

26. Property layouts need only Tract Numbers.

    Only property plats, property corners, and related property data that is surveyed will be expressed in meters. Other property data will be shown in units as recorded in courthouse records.

27. Right of Way obtains and remainders shall be shown in hectares or square meters with acres or square feet in parenthesis.

    Total obtains less than 0.10 hectare will be shown in square meters.

28. All Right of Way revisions shall be noted in the revision block or in the upper right hand corner of the sheet if no revision block is available.

B. All parcels of property to be acquired as right-of-way will be assigned a parcel number, identification of property owner, areas of property obtained and remaining, and acreage of permanent easements indicated. The entire parcel of property from which right-of-way is to be acquired will be shown (even if illustrated as an insert at a reduced scale).

C. All field inspection and public hearing recommendations accepted for inclusion in the plans are to be verified and made part of the right-of-way plans. Right-of-way plans will be provided to the Department Program Manager on bond (914 mm x 559 mm) prints and electronic media in MicroStation format. It is recommended that GEOPAK software be used for design, etc. No reverse-side prints are acceptable.

D. Electronic media receivables for right of way plans will be provided to the Road Design Consultant Services Facilitator on CD-ROM and will include the following items.

1. Preliminary index of all files provided with detailed descriptions of their content or purpose.

2. All MicroStation CADD files that pertain to existing property lines, owners, layouts their improvements and labeling.

3. All MicroStation CADD files that pertain to existing and proposed Right of Way lines, obtains and remains and it’s labeling as well as Right of Way Data sheets.

4. All MicroStation CADD files that pertain to existing and proposed pipes, drainage structures, Bridges and other hydraulic features as well as the labeling of these items.

5. All MicroStation CADD files that pertain to Utilities or Rail Roads.

6. All MicroStation CADD files that contain Typical Sections for projects.

7. All MicroStation and Raster CADD files that pertain to project Title Sheets.

8. All MicroStation CADD files that show construction limits of project.

9. All MicroStation CADD files that pertain to Moving Items.

10. Any other MicroStation CADD files that would supplement the ability to view files correctly such as reference files and cell libraries.

11. If GEOPAK Civil Design Software was used for developing plans, then all .gpk files and any other GEOPAK files, such as input and criteria files that are needed to facilitate the checking of Right of Way plans should be submitted.

12. If other Civil Engineering software package was used for project development then all binary or ASCII files that are software dependant for that package should be submitted.

13. Copies of any manual or electronic calculations or notes (non-CADD) that will facilitate the checking of Right of Way plans.

14. All hard copies of the plans submitted should have the name of the electronic file printed on the sheet.

15. Provide plotting instructions in order to reproduce all sheets including levels, plot boundary and pen tables.

E. During the course of completing the final plans for construction, should changes be necessary which will affect right-of-way, these revisions will be promptly made, documented as revisions on plans, and identified to those implementing right-of-way appraisal and acquisition.

ROADWAY CONSTRUCTION PLANS

A. Construction plans will be a continuation of right of way plans and a separate set is not acceptable. Original right of way plans will be retained by the Consultant after appropriate Department reviews and signatures and then developed into construction plans.

B. Plan and profile sheets for mainline roadways and intersection streets showing information necessary to permit construction stakeout and to indicate and delineate details necessary for construction.

C. Title Sheet for construction plans with Title Sheet for right of way to follow as Sheet 1A (for information only).

D. Detailed plan sheets for all design features requiring additional detail design information, including but not limited to:

- The geometry of intersections
- Local street treatment
- Drainage facilities
- Appurtenances
- Details covering special problems
- Geometric control (vertical and horizontal)
- Construction limits (lines)
- Right-of-way (existing and proposed)
- Ties and equalities
- Other as per Department standards
- Utilities
- Sedimentation and Erosion Control Plan
- Traffic Control Plan

D. (Continued)

- Pavement Marking Plan
- Moving Items
- Signing Plans

E. Drainage designs in accordance with the approved hydrological/hydraulic criteria. A complete tabulation of the drainage analysis along with the calculations used to determine the size of drainage structures will be submitted.

F. Additional cross-sections as necessary to complete construction of the project.

G. At locations where existing traffic is to be maintained, a detailed construction staging plan, showing details of all detour ratings, temporary pavements, and special traffic control devices will be provided. Required restrictions to construction sequence will also be included.

H. Construction Plans will be provided to the Department on reproducible bond (914 mm x 559 mm) prints and on electronic media in MicroStation format. It is recommended that roadway design be provided with the use of GEOPAK software. No reverse-side prints are acceptable.

I. Benchmarks shall be provided at a minimum of every 300 m of mainline or sideline length - Benchmark descriptions shall be placed on Reference Sheets.

J. Cross-sections plotted on a scale of 1:50 vertical and horizontal, unless another scale is authorized by the Department.

K. Construction plans shall also include the following:

1. Show riprap on plan sheets (in Tons) for areas requiring riprap.

2. Use of Types 16, 17, & 18 catch basins in areas of curb and gutter.

3. Show linear feet of guardrail and type anchor(s) to be used at each installation location on plans.

4. When needed to maintain traffic, use "Maintenance Stone" in lieu of Aggr. CR-14.

5. Traffic data including schematics of major intersections showing traffic flow should be shown on the Title Sheet.

6. Include Permanent Construction Signs and Mobilization on ALL roads.

7. If full depth patching is used be sure to include Maintenance Stone for this purpose.

8. Show all erosion control quantities in general construction note as inclusion items, unless detailed on plan sheets.

9. Include traffic control, pavement marking, and permanent signing in plans, if applicable.

10. Verify item numbers and units for quantities near end of completion of plans in case of recent changes and/or additions.

11. Constructability of project to meet present Department policies, standards and specifications.

12. Typical section stations should be inclusive of stations on job, ending and beginning at common stations or project exceptions and bridges.

13. Include all station equalities on title sheet under mileage box, plan and profile sheets, cross-sections and typical sections.

14. Include those items listed under the "Right-of-Way Plans" as required for construction.

15. All bid items shall have an item number on the Department's BAMS System.

16. Final description of moving items.

17. Bridges, exceptions, and bridge length box culverts (>6 m) should be flagged or shown in a box on the Title Sheet.

18. Special drawings for items not covered by standard drawings.

SPECIFICATIONS AND BID PROPOSAL

Consultant will prepare detailed specifications and special provisions covering items of construction not covered by the State's standard specifications or standard bridge special provisions. In addition, consultant will prepare a bid proposal as required by the Department. All bid items shall have an item number on the Department's CATS system.

CONSTRUCTION PHASE RECEIVABLES

One set of the bid proposal, specifications, special provisions and one set of bond (914 mm x 559 mm) prints of the final construction plans will be submitted to the Department for review. No reverse-side prints are acceptable.

Upon receipt of the final construction documents by the Department, one copy of the completed, checked and signed bond (914mm x 559 mm) prints of the final construction plans will be provided to the Department along with one copy of all quantity and design calculations, and final CADD and computer outputs.

The full size construction plans will be delivered to either the Department's Program Manager or Construction and Resource Manager, whichever is applicable, who will then forward them to the Road Design Operation's Manager. After a review of the plans for letting, the plans will be taken to Engineering Reproduction Services for printing and distribution to prospective Bidders. Any revisions made prior to the Long Ad shall be made by (A) the Consultant mailing a complete set of plans with revisions and up to date signatures to the same person mentioned above or (B) the Consultant inserting the revised sheet or sheets into the plans at the Department. After the revisions are made the old plans or old plan sheets will be discarded. Any revised plan sheets after the project has been made available to the Bidders will be delivered to the Department in the same way discussed above, but the revised sheets will not be inserted into the plans. The revised sheets with an addendum letter to the Bidder will be distributed with the original plans. For example if there are three addenda to the plans, then the original plans will be distributed to the Bidder with three addendum letters and the revised sheets. After the Letting, the plans will be corrected using the revised sheets. These revised plans will be marked by the Engineering Reproduction Manager on the Title Sheet, "DUPLICATE CONFORMED COPY" denoting that these plans have been revised and are now complete.

The Consultant will mark "Original Conformed Copy" on the top right quadrant of the Title Sheet of the original plans, which will include all revisions, made available to the Bidders prior to the Letting date.

After the Letting the Consultant will retain the Original Conformed Copy of the plans until construction is complete. At which time, the consultant will then deliver the plans to the Road Design Operation's Manager for permanent storage. The "Original Conformed Copy" of the plans will not be revised after the highway Letting. Any revisions made during construction will be included only in the "As-built" set of plans.

The complete bid Proposal shall be provided to the Department by electronic media in Adobe Acrobat (. pdf) format for reproduction. The electronic files for the bid Proposal will be provided by E-mail or CD-ROM to the Engineering Reproduction Manager or Construction and Resource Manager (CRM) who will deliver them to the Engineering Reproduction Manager in accordance with the letting schedule (no later than one week prior to "Plans and Proposal available to Contractors"). Changes to the Proposal after the Proposal has been made available to the Bidders will be sent by the Consultant to the Program Manager or the CRM, whichever is applicable, then the revised pages will be sent to the Contract Administration Office along with an addendum letter to the Bidder describing the change. The Contract Administration Office will distribute the revised sheets of the Proposal with the addendum letter to the Bidders along with the original Proposal (unchanged).

Electronic media receivables for roadway construction plans will be provided to the Road Design Consultant Services Facilitator on CD-ROM.

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2. All surveyed mapping, 2d or 3d contours, spot points, manual surveys, ortho photos and any other CADD files or data used in developing surveys for the project.

3. All MicroStation CADD files that pertain to the projects plan and profiles sheets which contain all horizontal and vertical alignments.

4. All MicroStation CADD files that contain any special drawings for the project.

5. All MicroStation CADD files that pertain to Sedimentation and Erosion Control plans.

6. All MicroStation CADD files that pertain to traffic control, pavement markings, detours and special traffic control devices.

7. All MicroStation CADD files that pertain to cross-sections for all project alignment.

8. All MicroStation CADD files that pertain to hydrological/hydraulic data and summary of drainage.

9. If GEOPAK Civil Engineering software was used for project development, then all gpk, ddb, inputs, criteria and tin files used for job should be submitted.

10. If other Civil Engineering software package was used for project development then all binary or ASCII files that are software dependant for that package should be submitted.

11. All electronic files that pertain to the construction stake out. Files should be in SMI format and should include all horizontal controls, vertical controls and templates.

PLAN PREPARATION GUIDE

CHAPTER 19

SPECIFICATIONS

1. SPECIFICATIONS:

All plans include by reference the Standard Specifications for Highway Construction Edition of 2000.

> **Specifications** are defined as:
> The general term comprising all the directions, provisions and requirements contained in the "Standard Specifications for Highway Construction" , together with such as may be added or adopted as supplemental specifications, or as special provisions, and all documents of any description, including notes on plans, pertaining to the method and manner of performing the work or to the quantities and qualities of materials to be furnished under the contract

2. SUPPLEMENTAL SPECIFICATIONS:

In addition to the Plans all proposals and contracts include Supplemental Specifications, and Special Provisions.

> **Supplemental Specifications** are specifications adopted subsequent to the publication of the Standard Specifications and which constitute a part thereof and of the contract. Supplemental Specifications shall prevail over Standard Specifications when in conflict therewith.

3. SPECIAL PROVISIONS:

> **Special Provisions** are provisions inserted in the proposal form and contract revising or supplementing the Standard Specifications to cover conditions peculiar to the individual project. Special provisions take precedence over Standard Specifications and Supplemental Specifications.

Special Provisions for all road and bridge projects are prepared by the Specifications and Estimates section of Road Design. Inquiries regarding Standard Specifications, Supplemental Specifications, or Special Provisions as related to plan preparation may be directed to this office.